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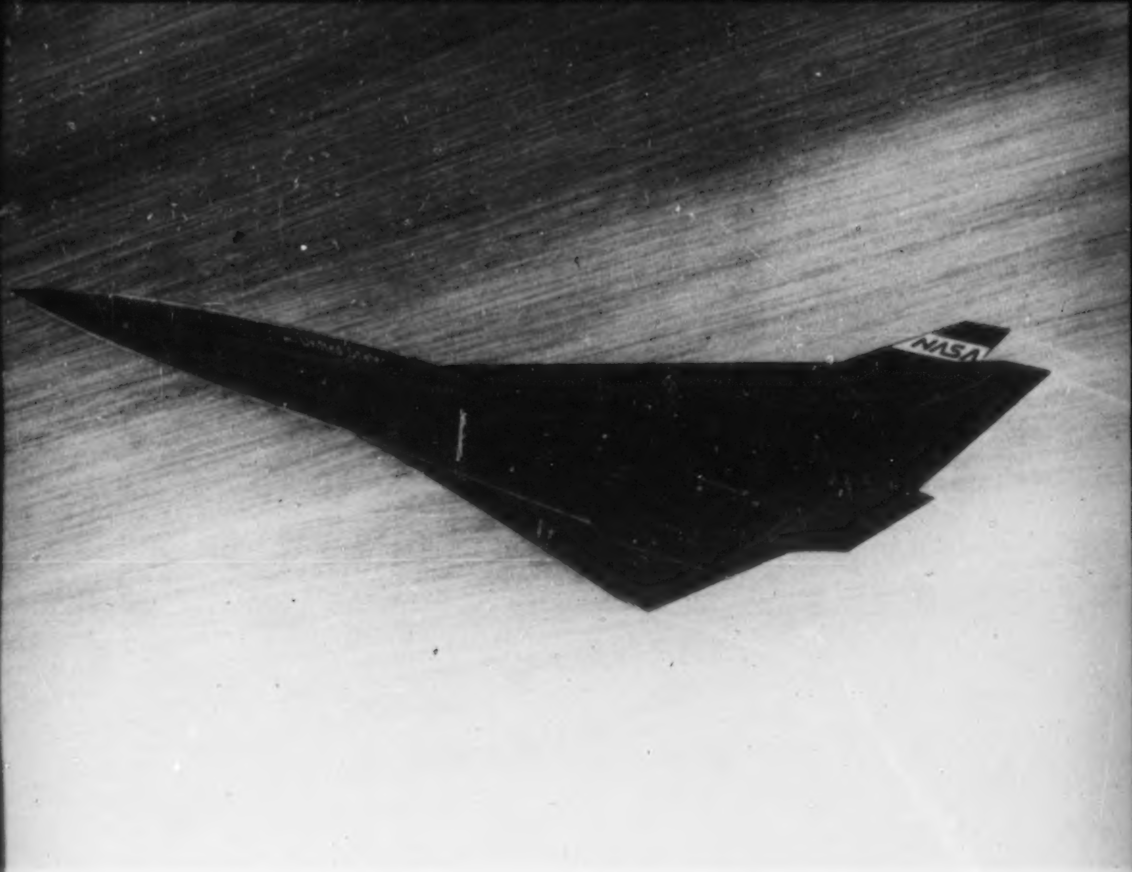

For aerospace scientists and engineers, what is impossible today is achievable tomorrow. They move us into the future—from concept to reality—with a vision of what we can do, where we might go, and how to get there. A National Aerospace Plane, a space station, a manned mission to Mars—all begin with a technically feasible idea that requires stretching a myriad of technologies to their fullest. Years of development in every technical aspect of flight and years of prototype demonstration and testing precede the reality of a new aerospace system. But progress begins with a concept, with a possible dream.

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Foreword

For the U.S. aerospace industry, 1986 was a year of contradiction. It was a year in which sales and backlog reached record levels, a year of impressive performance in the international marketplace, a year of solid accomplishment in product manufacture and development—but a disquieting year in that profits continued to decline at a time of heightened activity, prompting serious concern for the industry's financial future.

Overall sales increased by more than seven percent over the inflation rate and backlog grew by a moderate 3.7 percent. Those gains, however, are tempered by the fact that, for the first time in more than a decade, the flow of new orders fell below the previous year's level, evidencing the impact of negative-growth defense budgets of recent years. This impact, which had been anticipated, does not signal an immediate plunge in defense production, but rather a flattening of what had been a consistently rising military sales curve.

Perhaps the performance highlight of the year was the industry's impressive showing in international trade. At a time when the United States experienced the worst trade deficit in its history, the aerospace industry generated its greatest-ever level of export sales and a solid trade surplus that substantially offset the adverse impact of American losses in other categories of trade. This underscored once more the importance to the U.S. economy of high value, high technology aerospace exports and provided gratifying testimony to the continuing foreign acceptance of American aerospace products.

Our sales and export accomplishments, however, were overshadowed by the lowest profit rate in more than a decade. In each of the last two years, aerospace profit—as a percentage of sales—has dropped below the previous year's level and in each of those years the aerospace profit rate was sharply below the average for all U.S. manufacturing industries.

This trend is a matter of particular concern to a high-technology industry whose capital investment requirements are of exceptional order. The profit decline is due in substantial degree to a number of legislative and regulatory reforms instituted by the Congress and the Department of Defense. The industry is seeking modification of these reforms.

It is customary to attempt, in this annual foreword, a forecast of industry business levels in future years. This year there is a greater than usual array of uncertainties and one can assay future activity only in the most general terms.

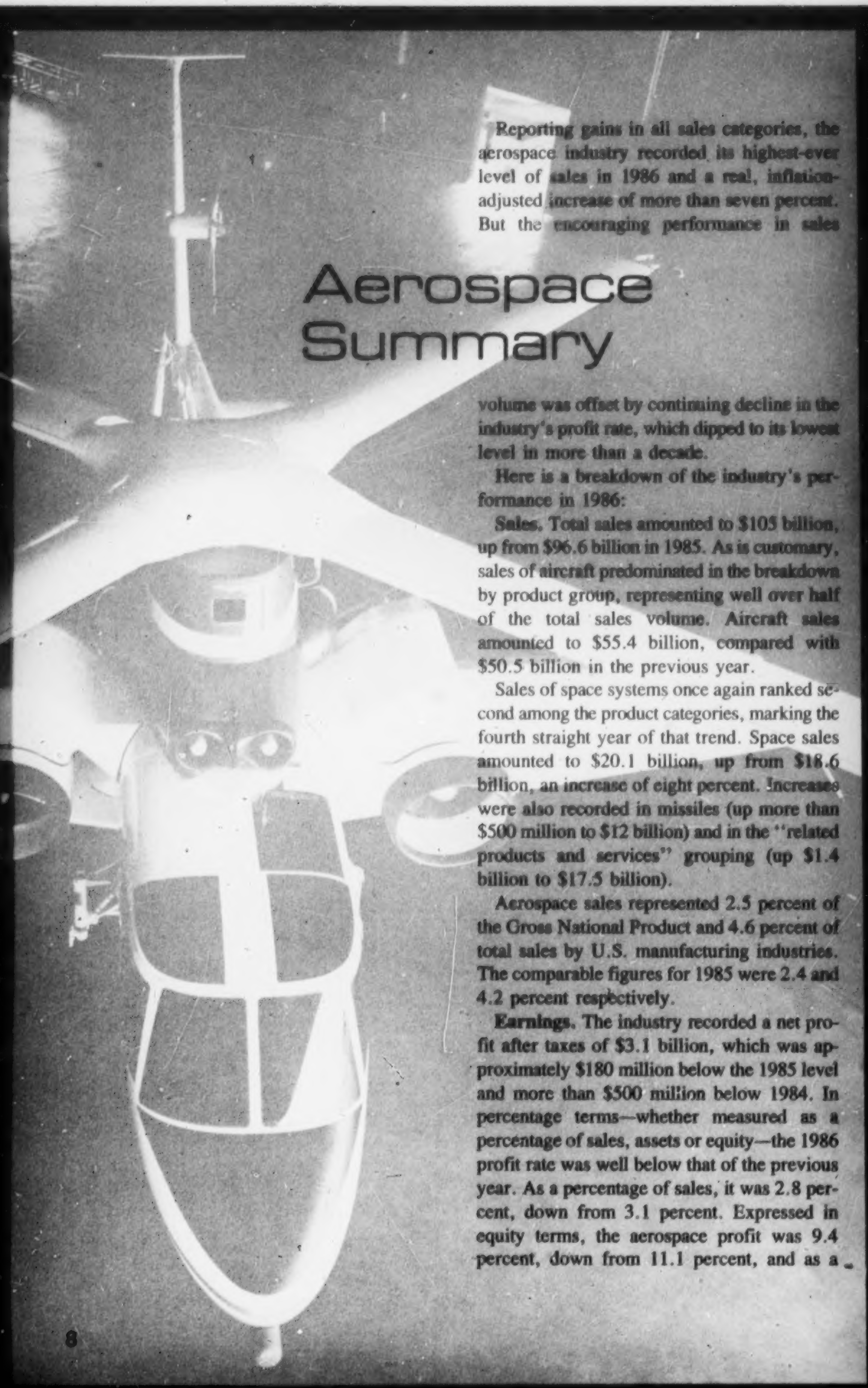
The record backlog suggests that the aerospace industry will have substantial activity in its three main workload areas—defense, space and commercial aircraft—for the remainder of the decade. But the reduced flow of orders suggests a leveling of the sales curve rather than continued growth.

Beyond that, several surveys agree that there will be a very large market for commercial transports through the end of the century. The question is how much of the market can U.S. manufacturers capture in the face of the still-intensifying competition from abroad. If the U.S. can retain its current share, the industry's commercial airplane workload should remain at a high level.

Since defense and space programs are largely government-financed, and since the need to reduce the national deficit may even more sharply impact those programs in future years, the picture for the 1990s is very misty. I feel intuitively that the American people will continue to support a strong national defense and a progressive space program and that there will be vigorous industry activity in these areas in the 1990s—but I would not attempt to assign dollar-value levels to such activity.

We have, in recent years, substantially improved the format and content of *Aerospace Facts and Figures* to make it more useful and informative. I trust that this 35th edition will meet with the wide acceptance enjoyed by its predecessors.

Don Fuqua
President
Aerospace Industries Association



Reporting gains in all sales categories, the aerospace industry recorded its highest-ever level of sales in 1986 and a real, inflation-adjusted increase of more than seven percent. But the encouraging performance in sales

Aerospace Summary

volume was offset by continuing decline in the industry's profit rate, which dipped to its lowest level in more than a decade.

Here is a breakdown of the industry's performance in 1986:

Sales. Total sales amounted to $105 billion, up from $96.6 billion in 1985. As is customary, sales of aircraft predominated in the breakdown by product group, representing well over half of the total sales volume. Aircraft sales amounted to $55.4 billion, compared with $50.5 billion in the previous year.

Sales of space systems once again ranked second among the product categories, marking the fourth straight year of that trend. Space sales amounted to $20.1 billion, up from $18.6 billion, an increase of eight percent. Increases were also recorded in missiles (up more than $500 million to $12 billion) and in the "related products and services" grouping (up $1.4 billion to $17.5 billion).

Aerospace sales represented 2.5 percent of the Gross National Product and 4.6 percent of total sales by U.S. manufacturing industries. The comparable figures for 1985 were 2.4 and 4.2 percent respectively.

Earnings. The industry recorded a net profit after taxes of $3.1 billion, which was approximately $180 million below the 1985 level and more than $500 million below 1984. In percentage terms—whether measured as a percentage of sales, assets or equity—the 1986 profit rate was well below that of the previous year. As a percentage of sales, it was 2.8 percent, down from 3.1 percent. Expressed in equity terms, the aerospace profit was 9.4 percent, down from 11.1 percent, and as a percentage of assets it was 3.0 percent, down from 3.5 percent. In all three cases, the aerospace figures were lower than the comparable average for all U.S. manufacturing industries.

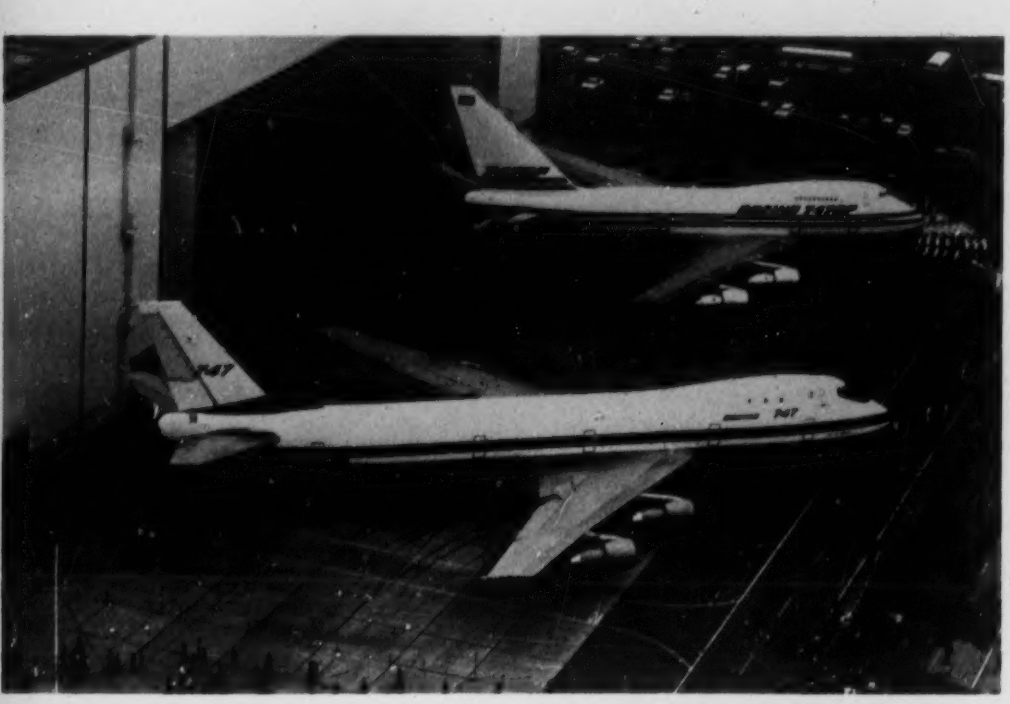
Orders and Backlog. For the first time in more than a decade, the flow of new orders fell below the previous year's level; at $111 billion, orders reported were $132 million below the 1985 figure. The decline was entirely due to a reduced level of orders from the government, more than $2 billion less than was recorded in 1985. Non-government orders increased moderately, but not enough to offset the drop in government orders. This decline was the first evidence of the anticipated impact of two consecutive negative-growth defense budgets.

Despite the decline, backlog at yearend reached a new record of $148.2 billion, up from $143.0 billion at yearend 1985. The 1986 backlog included $95.0 billion in government business and $53.2 billion in non-government orders. As is perennially true, the principal element of the backlog was orders for aircraft—$76.4 billion or more than 51 percent of the total. A breakdown once again underlines the decline in government orders due to reduced obligational authority: the government backlog for aircraft was $37.0 billion (down $1.2 billion) and the non-government backlog—largely orders for airline transports—was $39.4 billion (up $1.4 billion).

Civil Aircraft Production. In 1986, the industry produced the lowest number of civil aircraft in more than 30 years, yet sales in dollar terms increased substantially; the obvious reason is that production emphasis was on the higher value commercial transports, while sales of general aviation aircraft declined once again.

The industry turned out 2,151 civil aircraft, down from 2,683 in 1985 and less than one-eighth the number produced in the peak year (18,962 in 1978). The numerical decline was due largely to continuing depressed activity in the general aviation sector (down from 2,029 units in 1985 to 1,495 in 1986). There was also a drop in helicopter production (down from 376 to 326). Deliveries of commercial transports totaled 330, up 52 units over the previous year.

That major jump in airline transport production accounted for an overall sales gain of $1.5 billion to a 1986 total of $11.9 billion, compared with $10.4 billion in 1985. Transport sales, at $10.3 billion, were up by $1.8 billion,



offsetting dollar value declines in other categories: general aviation, down by $169 million to $1.3 billion; helicopters, down by $218 million to $287 million.

The backlog for civil transports at yearend 1986 was $22.3 billion (660 aircraft), which compares with the prior year backlog of $19.5 billion (662 aircraft). The outlook for continuing high levels of aerospace exports was bolstered by a significant increase in transport orders from foreign customers; on the books at yearend 1986 were foreign orders totaling $12.5 billion (293 aircraft).

Military Aircraft Production. Numerically speaking; 1986 production of military aircraft reversed a trend, marking an increase after three straight years of decline. The industry delivered 1,110 military aircraft, up 193 units over 1985.

The figure included 717 aircraft retained for service with U.S. military forces and 393 planes shipped abroad under either Foreign Military Sales (FMS) programs or direct contracts with foreign governments. FMS deliveries of 115 units represented a decline of 19 below the 1985 figure. Direct exports accounted for the major boost in the overall gain; they numbered 278, 136 more than in the previous year.

Department of Defense outlays for aircraft procurement totaled $30.8 billion in Fiscal Year 1986, up from $26.6 billion in FY 1985. DoD estimated $31.8 billion for FY 1987, followed by a dip to $29.8 billion in FY 1988.

Missile Programs. Sales of missile systems, at $12 billion, were up moderately over 1985's $11.4 billion. Bureau of the Census data, which exclude missile propulsion units and R&D, show a gain of similar proportion, from $8.0 billion in 1985 to $8.2 billion in 1986.

The flow of orders for new missile systems (again excluding propulsion units) increased at a much greater rate, from $8.1 billion in 1985 to more than $11.0 billion in 1986, a gain of 36 percent. Missiles and parts backlog at yearend 1986 was $12.8 billion, up from $10.2 billion at the end of the preceding year.

Space Programs. Sales of space systems continued on the upward trend in evidence since 1973. Combined civil/military sales amounted to $20.1 billion, compared with $18.6 billion in 1985. As has been the case for several years, the increase was due entirely to the expanding military space program. Department of Defense space activities outlays for FY 1986 were estimated at $11.9 billion, compared with NASA's $6.7 billion. For FY 1987, the estimates were $14.0 billion for DoD and $6.8 billion for NASA.

Bureau of the Census data, which exclude propulsion units and R&D and therefore provide only a general indication of trend rather than precise comparison, show a decline in new orders for space systems. Census reported new orders totaling $7.4 billion for 1986, down from $8.4 billion in 1985. Orders declined in both the civil and military space programs. The combined backlog nonetheless increased to $8.1 billion, up from 1985's $6.7 billion.

Research and Development. Outlays for industrial research and development, meaning all R&D performed in industry facilities whether company-funded or government-funded, increased significantly in 1986, as it has throughout the 1980s. The National Science Foundation listed total outlays of $85.7 billion, a gain of roughly 9.6 percent over the previous year's $78.2 billion. Company-funded R&D, at $54.7 billion, accounted for almost 64 percent of the total.

A separate report by McGraw Hill Publications Company showed that the aerospace industry, perennial leader among U.S. industries in terms of industrial R&D outlays, once again topped the list with expenditures of $18.5 billion, 22 percent of an estimated $82.9 billion total. McGraw Hill's preliminary estimates for 1987 indicate that aerospace will retain top ranking with outlay growth of more than $1 billion.

Foreign Trade. Once again industry sales abroad demonstrated the importance of high-value, high-technology aerospace exports to the U.S. economy. In a year when the United States as a whole experienced its 11th consecutive trade deficit and the worst in its history, the aerospace industry reported a trade *surplus* of $11.8 billion and the highest-ever level of aerospace exports—$19.7 billion.

The 1986 trade balance compares with $12.6 billion in the previous year and the all-time high of $13.1 billion in 1981. The 1986 surplus was achieved despite a record influx of aerospace imports, which totaled $7.9 billion.

Aerospace exports amounted to 9.6 percent of total U.S. exports, the highest figure in 16 years; it compares with nine percent in 1985 and an average of 7.8 percent for the period 1980-85.

The aerospace export volume was composed of 75 percent civil products, and 25 percent military equipment, a significant increase in the civil side of the civil/military export ratio; in the previous year, the ratio was 69 percent civil, 31 percent military, and in 1984 it was 64-36 percent. Civil exports gained by almost $2 billion to a 1986 level of $14.8 billion. The major factor in that gain was an increase in deliveries of airline transports to foreign customers, up from $5.5 billion in 1985 to $6.3 billion.

The record aerospace import volume was $1.8 billion higher than in 1985. Most of the gain was in civil imports, which rose from $5.0 billion in 1985 to $6.4 billion in 1986.

Employment. Aerospace employment averaged 1,272,000 in 1986, up 92,000 over 1985; these figures are based on a major statistical revision that indicated somewhat lower industry employment than previously estimated.

The industry's annual payroll for 1986 came to $30.9 billion, similarly adjusted to reflect the employment revisions. It represented 6.6 percent of the total payroll of all U.S. manufacturing industries.

STANDARD INDUSTRIAL CLASSIFICATIONS APPLICABLE TO THE AEROSPACE INDUSTRY

3721 **AIRCRAFT**

37211	Complete Aircraft, Military Type
37212	Complete Aircraft, Personal & Utility Type
37213	Complete Aircraft, Commercial Transport Type
37214	Modifications, Conversions, Overhaul of Aircraft
37216	Other Aeronautical Services on Aircraft

3724 **AIRCRAFT ENGINES AND ENGINE PARTS**

37241	Aircraft Engines for U.S. Military Customers
37242	Aircraft Engines for Other than U.S. Military
37243	Aeronautical Services on Aircraft Engines
37244	Aircraft Engine Parts and Accessories

3728 **AIRCRAFT PARTS AND AUXILIARY EQUIPMENT, NEC**

37281	Aircraft Parts & Accessories, NEC
37283	Research and Development on Aircraft Parts
37285	Aircraft Propellers and Parts

3761 **GUIDED MISSILES AND SPACE VEHICLES**

37611	Missile Systems, Excluding Propulsion
37612	Space Vehicle Systems, Excluding Propulsion
37613	Research & Development on Complete Missiles
37614	Research & Development on Complete Space Vehicles
37615	All Other Services on Complete Missiles & Space Vehicles

3764 **SPACE PROPULSION UNITS AND PARTS**

37645	Complete Missile or Space Vehicle Engines and/or Propulsion Units
37646	Research and Development on Complete Missile or Space Vehicle Engines and/or Propulsion Units
37647	All Other Services on Complete Missile or Space Vehicle Engines and/or Propulsion Units
37648	Missile and Space Vehicle Engine and/or Propulsion Unit Parts and Accessories

3769 **SPACE VEHICLE EQUIPMENT, NEC**

37692	Missile & Space Vehicle Parts & Subassemblies, NEC
37694	Research & Development on Missile & Space Vehicle Parts & Components, NEC

3662 **RADIO AND TELEVISION COMMUNICATION EQUIPMENT**

36621	Communication Systems and Equipment, Including Space Satellite Communications Systems
36625	Search & Detection Systems and Navigation and Guidance Systems & Equipment
36629	Electronic Systems and Equipment NEC, including Electronic Trainers and Simulators

3811 **ENGINEERING AND SCIENTIFIC INSTRUMENTS**

38111	Aeronautical, Nautical, and Navigational Instrumens, except Aircraft Engine Instruments

3829 **MEASURING AND CONTROLLING DEVICES**

38291	Aircraft Engine Instruments except Flight

Source: U.S. Government Office of Management and Budget, *Standard Industrial Classification Manual, 1972* (incorporating revisions from the 1977 Supplement).

NOTE: The Standard Industrial Classification (SIC) is a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. It is revised periodically to reflect the changing industrial composition of the economy.

NEC: Not elsewhere classified.

AEROSPACE INDUSTRY SALES BY CUSTOMER

Calendar Years 1972-1986
(Millions of Dollars)

Year	TOTAL SALES	Aerospace Products and Services				Related Products and Services
		Total	U.S. Government		Other Customers	
			Dept. of Defense	NASA and Other Agencies		
CURRENT DOLLARS						
1972	$23,610	$20,964	$13,293	$2,649	$ 5,022	$2,646
1973	25,837	22,494	12,939	2,459	7,096	3,343
1974	27,454	23,387	12,638	2,608	8,141	4,067
1975	29,686	24,894	13,125	2,838	8,931	4,792
1976	29,825	24,514	13,403	2,938	8,173	5,311
1977	32,199	26,095	14,368	3,012	8,715	6,104
1978	37,702	30,889	15,533	3,151	12,205	6,813
1979	45,420	37,705	18,918	3,453	15,334	7,715
1980	54,697	45,878	22,795	4,106	18,977	8,819
1981	63,974	53,090	27,244	4,709	21,137	10,884
1982	67,756	56,366	34,016	4,899	17,451	11,390
1983	79,975	66,646	41,558	5,910	19,178	13,329
1984	83,486	69,572	45,969	6,063	17,540	13,914
1985	96,571	80,476	53,178	6,262	21,036	16,095
1986	105,011	87,509	59,161	6,236	22,112	17,502
CONSTANT DOLLARS (Aerospace Composite Price Deflator, 1982 = 100)						
1972	$61,484	$54,593	$34,617	$6,898	$13,078	$6,891
1973	60,226	52,434	30,161	5,732	16,541	7,792
1974	58,165	49,548	26,775	5,525	17,248	8,617
1975	56,011	46,970	24,764	5,355	16,851	9,041
1976	51,422	42,265	23,109	5,065	14,091	9,157
1977	51,850	42,021	23,137	4,850	14,034	9,829
1978	57,648	47,231	23,751	4,818	18,662	10,417
1979	62,822	52,151	26,166	4,776	21,209	10,671
1980	68,116	57,133	28,387	5,113	23,633	10,983
1981	70,768	58,728	30,137	5,209	23,382	12,040
1982	67,756	56,366	34,016	4,899	17,451	11,390
1983	76,239	63,533	39,617	5,634	18,282	12,706
1984[r]	74,475	62,062	41,007	5,408	15,647	12,412
1985[r]	86,224	71,854	47,480	5,591	18,782	14,371
1986	92,358	76,960	52,031	5,485	19,448	15,393

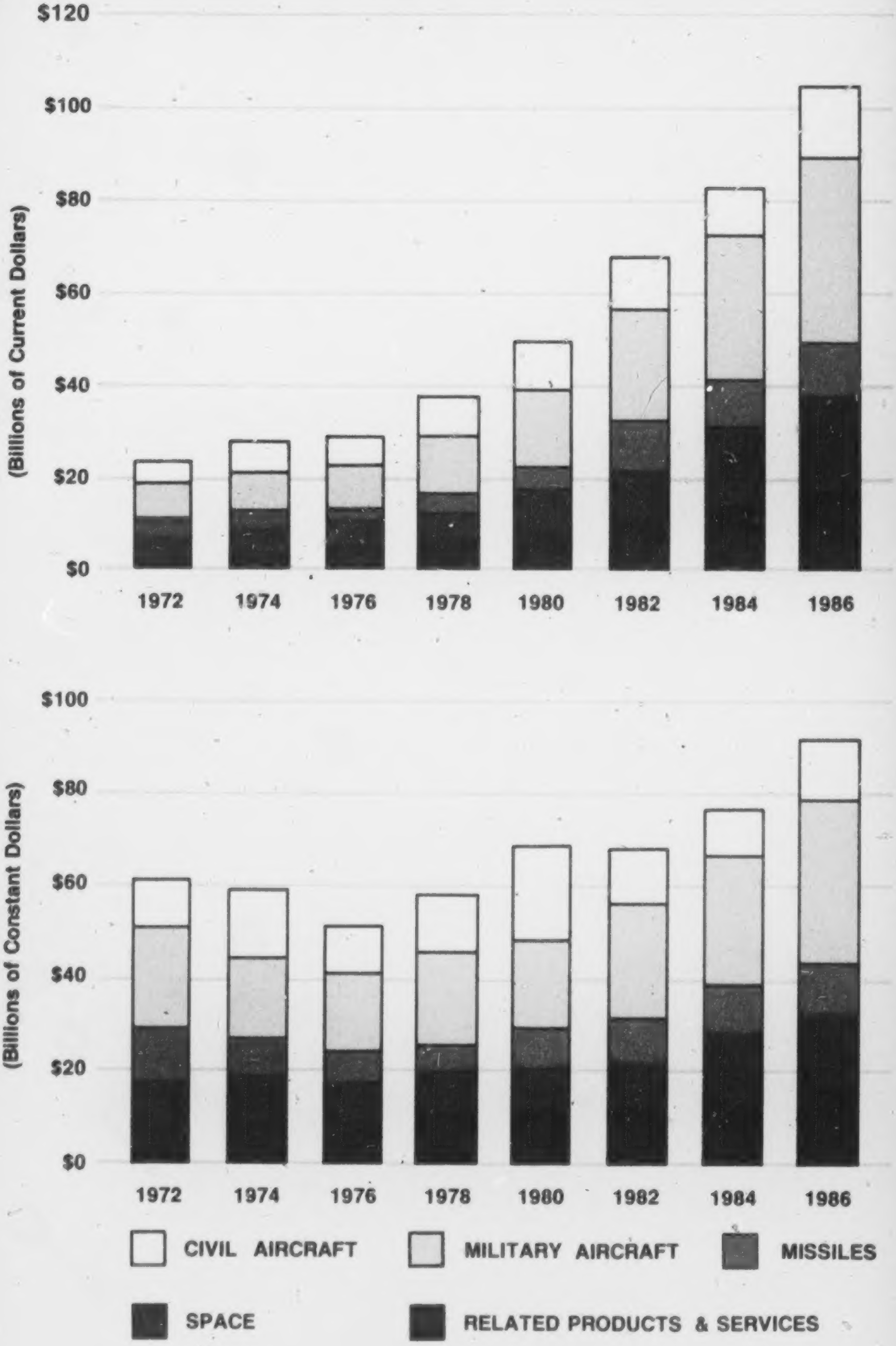
Source: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Industry," "Aerospace Sales," "Other Customers," and "Related Products and Services."

A comprehensive revision of the AIA aerospace industry sales series for 1967-1984 was completed in 1985 in order to incorporate different data sources and estimating procedures selected to better reflect the evolving composition of the aerospace industry.

Revised.

AEROSPACE SALES BY PRODUCT GROUP



Source: Aerospace Industries Association
[a]Based on revised aerospace composite price deflator (1980 = 100)

AEROSPACE INDUSTRY SALES BY PRODUCT GROUP

Calendar Years 1972-1986
(Millions of Dollars)

Year	TOTAL SALES	Aircraft			Missiles	Space	Related Products & Services
		Total	Civil	Military			
CURRENT DOLLARS							
1972	$23,610	$12,516	$ 4,181	$ 8,335	$ 4,285	$ 4,163	$ 2,646
1973	25,837	14,144	5,742	8,402	4,224	4,126	3,343
1974	27,454	14,867	6,320	8,547	4,108	4,412	4,067
1975	29,686	16,433	6,463	9,970	3,775	4,686	4,792
1976	29,825	16,056	6,007	10,049	3,671	4,787	5,311
1977	32,199	16,988	6,183	10,805	4,106	5,001	6,104
1978	37,702	21,074	8,222	12,852	4,098	5,717	6,813
1979	45,420	26,382	13,227	13,155	4,778	6,545	7,715
1980	54,697	31,464	16,285	15,179	6,469	7,945	8,819
1981	63,974	36,062	16,427	19,635	7,640	9,388	10,884
1982	67,756	35,484	10,982	24,502	10,368	10,514	11,390
1983	79,975	42,431	12,373	30,058	10,269	13,946	13,329
1984	83,486	41,905	10,690	31,215	11,335	16,332	13,914
1985	96,571	50,482	13,730	36,572	11,438	18,556	16,095
1986	105,011	55,428	15,718	39,710	11,964	20,117	17,502
CONSTANT DOLLARS (Aerospace Composite Price Deflator, 1982 = 100)							
1972	$61,484	$32,594	$10,888	$21,706	$11,159	$10,841	$ 6,891
1973	60,226	32,970	13,385	19,585	9,846	9,618	7,792
1974	58,165	31,498	13,390	18,108	8,703	9,347	8,617
1975	56,011	31,005	12,194	18,811	7,123	8,842	9,041
1976	51,422	27,683	10,357	17,326	6,329	8,253	9,157
1977	51,850	27,356	9,957	17,399	6,612	8,053	9,829
1978	57,648	32,223	12,572	19,651	6,266	8,742	10,417
1979	62,822	36,490	18,295	18,195	6,609	9,052	10,671
1980	68,116	39,183	20,280	18,903	8,056	9,894	10,983
1981	70,768	39,891	18,171	21,720	8,451	10,385	12,040
1982	67,756	35,484	10,982	24,502	10,368	10,514	11,390
1983	76,239	40,449	11,795	28,654	9,789	13,295	12,706
1984[r]	74,475	37,382	9,536	27,846	10,111	14,569	12,412
1985[r]	86,224	45,073	12,259	32,814	10,212	16,568	14,371
1986	92,358	48,749	13,824	34,925	10,522	17,693	15,393

Source: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Industry," "Aerospace Sales," and "Related Products & Services." A comprehensive revision of the AIA aerospace industry sales series for 1967-1984 was completed in 1985 in order to incorporate different data sources and estimating procedures selected to better reflect the evolving composition of the aerospace industry.

[r] Revised.

SALES OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1972-1986
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, & Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
CURRENT DOLLARS									
1972	$21,499	$13,492	$ 8,007	$ 4,954	$ 5,199	$ 5,598	$ 2,067	$1,035	$ 2,646
1973	24,305	14,431	9,874	5,539	6,739	5,580	2,103	1,001	3,343
1974	26,849	15,196	11,653	5,982	7,560	5,854	2,101	1,285	4,067
1975	29,473	17,314	12,159	6,859	7,797	6,310	2,070	1,645	4,792
1976	31,328	19,083	12,245	8,314	7,622	5,880	2,368	1,833	5,311
1977	33,315	20,704	12,611	8,848	7,530	5,775	2,839	2,219	6,104
1978	37,968	21,888	16,080	8,724	10,581	6,380[a]	3,363	2,107[a]	6,813
1979	46,173	23,229	22,944	8,649	16,023	7,197	3,930	2,659	7,715
1980	58,440	26,674	31,766	9,427	20,097	8,393	6,869	2,609	11,045
1981	69,944	33,039	36,905	12,047	21,527	9,722	8,155	3,384	15,109
1982	75,487	42,239	33,248	15,120	16,766	11,980	9,909	4,953	16,759
1983	83,453	49,056	34,397	17,074	18,805	12,745	12,685	2,804	19,340
1984	88,941	55,777	33,164	20,216	17,069	13,624	12,734	2,768	22,530
1985[r]	100,522	63,532	36,990	21,899	22,041	16,741	15,228	2,938	21,675
1986	105,577	65,326	40,251	22,755	25,002	17,535	16,243	3,564	20,478
CONSTANT DOLLARS (1982 = 100)[b]									
1972	$55,987	$35,135	$20,852	$12,901	$13,539	$14,578	$ 5,383	$2,695	$ 6,891
1973	56,655	33,639	23,016	12,911	15,709	13,007	4,902	2,333	7,793
1974	56,883	32,195	24,689	12,674	16,017	12,403	4,451	2,722	8,617
1975	55,609	32,668	22,942	12,942	14,711	11,906	3,906	3,104	9,042
1976	54,014	32,902	21,112	14,334	13,141	10,138	4,083	3,160	9,157
1977	53,647	33,340	20,308	14,248	12,126	9,300	4,572	3,573	9,829
1978	58,055	33,468	24,587	13,339	16,179	9,755	5,142	3,222	10,417
1979	63,863	32,129	31,734	11,963	22,162	9,954	5,436	3,678	10,671
1980	72,777	33,218	39,559	11,740	25,027	10,452	8,554	3,249	13,755
1981	77,372	36,548	40,824	13,326	23,813	10,754	9,021	3,743	16,713
1982	75,487	42,239	33,248	15,120	16,766	11,980	9,909	4,953	16,759
1983	79,555	46,765	32,790	16,276	17,927	12,150	12,092	2,673	18,437
1984[r]	79,341	49,756	29,584	18,034	15,227	12,153	11,360	2,469	20,098
1985[r]	89,752	56,725	33,027	19,553	19,679	14,947	13,596	2,623	19,353
1986	92,856	57,455	35,401	20,013	21,989	15,422	14,286	3,135	18,011

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] AIA estimate based on M37D data.

[b] Based on revised aerospace composite price deflator; detail may not add to totals because of rounding.

[r] Revised.

ORDERS AND BACKLOG OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1972-1986
(Millions of Current Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, & Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
NET NEW ORDERS									
1972	$23,842	$14,817	$ 9,025	$ 5,760	$ 5,745	$ 6,090	$ 1,853	$ 965	$ 3,429
1973	27,044	15,804	11,240	6,327	6,684	5,978	1,904	1,107	5,044
1974	32,704	19,390	13,314	7,956	8,612	6,827	2,208	1,872	5,229
1975	28,995	18,593	10,402	7,821	6,336	6,082	2,127	2,068	4,561
1976	35,992	21,056	14,936	9,513	8,410	5,751	2,431	3,241	6,646
1977	38,922	22,682	16,240	9,369	11,193	6,232	3,554	2,170	6,404
1978	49,819	25,992	23,827	11,150	16,961	7,072[b]	4,631	2,450[b]	7,555
1979[a]	67,561[a]	28,107	37,101	8,762	30,695	7,609	5,184	4,487	8,471
1980	69,624	33,496	36,128	16,555	18,123	9,818	8,528	4,081	12,519
1981	74,922	42,431	32,491	16,946	17,911	12,376	9,350	3,250	15,089
1982[a]	89,168[a]	58,849[a]	30,319[a]	20,547	13,591	13,988	13,643	4,762	20,369
1983	91,647	60,290	31,357	22,171	16,428	14,248	15,209	2,641	20,950
1984	104,863	66,968	37,895	25,829	21,273	16,485	14,050	3,461	23,765
1985[r]	110,968	70,240	40,728	23,751	26,191	20,328	14,466	3,064	23,168
1986	110,836	68,001	42,835	21,642	26,315	20,445	16,439	3,907	22,088
BACKLOG AS OF DECEMBER 31									
1972	$26,922	$15,322	$11,600	$ 7,027	$ 8,605	$ 5,272	$ 2,018	$ 972	$ 3,028
1973	29,661	16,695	12,966	7,815	8,550	5,670	1,819	1,078	4,729
1974	35,516	20,889	14,627	9,789	9,602	6,643	1,926	1,665	5,891
1975	35,038	22,168	12,870	10,751	8,141	6,415	1,983	2,088	5,660
1976	39,702	24,141	15,561	11,950	8,929	6,286	2,046	3,496	6,995
1977	45,309	26,119	19,190	12,471	12,592	6,743	2,761	3,447	7,295
1978	57,160	30,223	26,937	14,897	18,972	7,557	4,029	3,668	8,037
1979[a]	78,548[a]	36,136	42,123	17,316	33,168	7,388	5,613	5,112	9,662
1980	89,732	37,199	52,533	17,435	39,800	8,941	8,421	5,127	10,008
1981	94,710	46,591	48,119	21,292	35,022	11,255	9,052	4,940	13,149
1982[a]	108,391[a]	63,201[a]	45,190[a]	26,644	31,920	13,262	13,268	4,269	16,760
1983	116,585	74,435	42,150	30,688	29,684	14,962	18,489	3,684	19,078
1984	132,507	85,626	46,881	36,312	33,877	17,823	19,684	4,498	20,313
1985[r]	142,953	92,334	50,619	38,150	38,041	21,410	18,677	4,869	21,806
1986	148,212	95,009	53,203	37,044	39,350	24,320	19,133	4,952	23,416

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] 1979 and 1982 Orders and Backlog Totals are final revisions for which product group detail is not available.

[b] AIA estimate based on M37D data.

[r] Revised.

AEROSPACE SALES AND THE NATIONAL ECONOMY

Calendar Years 1972-1986
(Billions of Dollars)

Year	Gross National Product[c]	Industry Sales			Aerospace Sales As Percent of		
		Manufacturing	Durable Goods	Aerospace	GNP	Manufacturing	Durable Goods
CURRENT DOLLARS							
1972	$1,212.8	$ 756.3	$ 408.3	$23.6	1.9%	3.1%	5.8%
1973	1,359.3	875.2	476.2	25.8	1.9	2.9	5.4
1974	1,472.8	1,017.5	530.8	27.5	1.9	2.7	5.2
1975	1,598.4	1,039.1	523.9	29.7	1.9	2.9	5.7
1976	1,782.8	1,185.6	608.4	29.8	1.7	2.5	4.9
1977	1,990.5	1,358.4	711.2	32.2	1.6	2.4	4.5
1978	2,249.7	1,522.9	814.2	37.7	1.7	2.5	4.6
1979	2,508.2	1,727.2	912.7	45.4	1.8	2.6	5.0
1980	2,732.0	1,852.7	930.6	54.7	2.0	3.0	5.9
1981	3,052.6	2,017.5	1,006.5	64.0	2.1	3.2	6.4
1982	3,166.0	1,910.3	922.3	67.8	2.1	3.5	7.4
1983	3,401.6	2,045.3	1,019.4	80.0	2.4	3.9	7.8
1984	3,774.7	2,274.9	1,182.0	83.5	2.2	3.7	7.1
1985[r]	3,998.1	2,279.1	1,187.2	96.6	2.4	4.2	8.1
1986	4,206.1	2,273.3	1,201.7	105.0	2.5	4.6	8.7

CONSTANT DOLLARS (1982 = 100)[a]					Real Annual Growth[b]			
					GNP	Mfg.	Durs.	Aero.
1972	$2,608.2	$1,626.5	$ 878.1	$61.5	5.0%	7.6%	8.4%	2.7%
1973	2,746.1	1,768.1	962.0	60.2	5.3	8.7	9.6	(2.1)
1974	2,727.4	1,884.3	983.0	58.2	(0.7)	6.6	2.2	(3.3)
1975	2,695.4	1,752.3	883.5	56.0	(1.2)	(7.0)	(10.1)	(3.8)
1976	2,825.4	1,878.9	964.2	51.4	4.8	7.2	9.1	(8.2)
1977	2,957.7	2,018.4	1,056.8	51.9	4.7	7.4	9.6	1.0
1978	3,115.9	2,109.3	1,127.7	57.6	5.3	4.5	6.7	11.0
1979	3,191.1	2,197.5	1,161.2	62.8	2.4	4.2	3.0	9.0
1980	3,187.9	2,161.8	1,085.9	68.1	(0.1)	(1.6)	(6.5)	8.4
1981	3,247.4	2,146.3	1,070.7	70.8	1.9	(0.7)	(1.4)	4.0
1982	3,166.0	1,910.3	922.3	67.8	(2.5)	(11.0)	(13.9)	(4.2)
1983	3,277.1	1,970.4	982.1	76.2	3.5	3.1	6.5	12.4
1984[r]	3,491.9	2,104.4	1,093.4	74.5	6.6	6.8	11.3	(2.2)
1985[r]	3,585.7	2,044.0	1,064.8	86.2	2.7	(2.9)	(2.6)	15.7
1986	3,670.2	1,983.7	1,048.6	92.4	2.4	(3.0)	(1.5)	7.2

Source: Gross National Product and GNP Implicit Price Deflator: "Economic Report of the President" (Annually) and "Survey of Current Business" (Monthly). Sales of Manufacturing and Durable Goods Industries: "Survey of Current Business" (Monthly). Aerospace Sales: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Sales."

[a] Based on aerospace composite price deflator for aerospace industry sales, and GNP implicit price deflator for other series.

[b] Parentheses indicate negative real annual growth.

[c] Calendar year GNP figures have been changed to reflect revisions to the National Income and Product Accounts (NIPA).

[r] Revised.

GROSS NATIONAL PRODUCT, FEDERAL BUDGET AND DEFENSE BUDGET

Fiscal Years 1953-1988
(Billions of Dollars)

Year	Fiscal Year GNP	Federal Budget Outlays		Defense Outlays as Percent of	
		Net Total[a]	Defense[b]	GNP	Federal Budget
1953	$ 365.1	$ 76.1	$ 52.8	14.5%	69.4%
1954	369.4	70.9	49.3	13.3	69.5
1955	387.6	68.4	42.7	11.0	62.4
1956	418.0	70.6	42.5	10.2	60.2
1957	441.2	76.6	45.4	10.3	59.3
1958	449.8	82.4	46.8	10.4	56.8
1959	479.5	92.1	49.0	10.2	53.2
1960	507.7	92.2	48.1	9.5	52.2
1961	519.0	97.7	49.6	9.6	50.8
1962	556.6	106.8	52.3	9.4	49.0
1963	588.6	111.3	53.4	9.1	48.0
1964	629.4	118.5	54.8	8.7	46.2
1965	673.6	118.2	50.6	7.5	42.8
1966	740.5	134.5	58.1	7.8	43.2
1967	793.5	157.5	71.4	9.0	45.3
1968	852.4	178.1	81.9	9.6	46.0
1969	929.5	183.6	82.5	8.9	44.9
1970	990.5	195.6	81.7	8.2	41.8
1971	1,057.1	210.2	78.9	7.5	37.5
1972	1,151.2	230.7	79.2	6.9	34.3
1973	1,285.5	245.7	76.7	6.0	31.2
1974	1,417.0	269.4	79.3	5.6	29.4
1975	1,523.5	332.3	86.5	5.7	26.0
1976	1,699.6	371.8	89.6	5.3	24.1
1977	1,935.8	409.2	97.2	5.0	23.8
1978	2,173.4	458.7	104.5	4.8	22.8
1979	2,452.2	503.5	116.3	4.7	23.1
1980	2,667.6	590.9	134.0	5.0	22.7
1981	2,986.2	678.2	157.5	5.3	23.2
1982	3,141.5	745.7	185.3	5.9	24.8
1983	3,320.9	808.3	209.9	6.3	26.0
1984	3,695.3	851.8	227.4	6.2	26.7
1985	3,936.8	946.3	252.7	6.4	26.7
1986	4,163.0	989.8	273.4	6.6	27.6
1987[E]	4,419.0	1,015.6	282.2	6.4	27.8
1988[E]	4,731.0	1,024.3	297.6	6.3	29.1

Source: "The Budget of the United States Government" (Annually) and Office of Management and Budget, "Federal Government Finances, 1985 Budget Data."

[a] "Net Total" is government-wide total less intragovernmental transactions.

[b] "Defense" includes the military budget of DOD and other defense-related activities. Beginning in FY 1985, the Federal Budget reflects establishment of a military retirement trust fund. Defense budget data for prior years adjusted for comparable treatment of military retired pay.

[E] Estimate

FEDERAL OUTLAYS
DEFENSE, NASA AND AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1961-1988
(Millions of Dollars)

Year	TOTAL National Defense	TOTAL NASA	Federal Outlays for Aerospace Products & Services			Aerospace as Percent of Total National Defense and NASA
			TOTAL	DOD[a]	NASA	
1961	$ 49,601	$ 744	$ 9,516	$ 8,870	$ 646	18.9%
1962	52,345	1,257	11,244	10,101	1,143	21.0
1963	53,400	2,552	12,453	10,126	2,327	22.3
1964	54,757	4,171	13,363	9,630	3,733	22.7
1965	50,620	5,093	11,858	7,296	4,561	21.3
1966	58,111	5,933	14,064	8,704	5,360	22.0
1967	71,417	5,426	15,478	10,341	5,137	20.1
1968	81,926	4,724	16,279	11,681	4,598	18.8
1969	82,497	4,251	15,871	11,686	4,185	18.3
1970	81,692	3,753	14,559	10,860	3,699	17.0
1971	78,872	3,382	13,109	9,771	3,338	15.9
1972	79,174	3,422	12,308	8,936	3,372	14.9
1973	76,681	3,315	11,359	8,089	3,270	14.2
1974	79,347	3,256	11,168	7,987	3,181	13.5
1975	86,509	3,266	11,554	8,373	3,181	12.9
1976	89,619	3,669	12,364	8,816	3,548	13.3
Tr. Qtr.	22,269	952	2,855	1,959	926	12.3
1977	97,241	3,945	13,229	9,389	3,840	13.1
1978	104,495	3,983	13,926	10,067	3,859	12.8
1979	116,342	4,196	16,686	12,622	4,064	13.8
1980	133,995	4,852	20,270	15,558	4,712	14.6
1981	157,513	5,426	24,280	19,002	5,278	14.9
1982	185,309	6,035	29,501	23,575	5,926	15.4
1983	209,903	6,664	35,364	28,808	6,556	16.3
1984	227,413	7,048	39,662	32,723	6,939	16.9
1985	252,748	7,251	44,416	37,335	7,081	17.1
1986	273,375	7,403	49,773	42,558	7,215	17.7
1987[E]	282,246	7,876	53,076	45,329	7,747	18.2
1988[E]	297,550	9,534	53,367	43,985	9,382	17.4

Source: "The Budget of the United States Government" (Annually).

NOTE: "National Defense" includes the military budget of the Department of Defense and other defense-related activities. "TOTAL NASA" includes all categories of the NASA budget. NASA construction not included in "Aerospace Products and Services." See additional explanation with following table.

[a] Outlays for aircraft and missile procurement. Does not include RDT&E, which DOD has not reported by product group since 1977, and which, for comparability, has been subtracted from data previously reported in this table for earlier years. Also included are revisions to missile procurement data.

[E] Estimate. Latest year reflects Administration's budget proposal.

FEDERAL OUTLAYS FOR AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1961-1988
(Millions of Dollars)

Year	TOTAL	Department of Defense[a]			NASA[b]
		TOTAL	Aircraft	Missiles[c]	
1961	$ 9,516	$ 8,870	$ 5,898	$ 2,972	$ 646
1962	11,244	10,101	6,659	3,442	1,143
1963	12,453	10,126	6,309	3,817	2,327
1964	13,363	9,630	6,053	3,577	3,733
1965	11,858	7,296	5,200	2,096	4,562
1966	14,064	8,704	6,635	2,069	5,360
1967	15,478	10,341	8,411	1,930	5,137
1968	16,279	11,681	9,462	2,219	4,598
1969	15,871	11,686	9,177	2,509	4,185
1970	14,559	10,860	7,948	2,912	3,699
1971	13,109	9,771	6,631	3,140	3,338
1972	12,308	8,936	5,927	3,009	3,372
1973	11,359	8,089	5,066	3,023	3,270
1974	11,168	7,987	5,006	2,981	3,181
1975	11,554	8,373	5,484	2,889	3,181
1976	12,364	8,816	6,520	2,296	3,548
Tr. Qtr.	2,885	1,959	1,557	402	926
1977	13,229	9,389	6,608	2,781	3,840
1978	13,926	10,067	6,971	3,096	3,859
1979	16,686	12,622	8,836	3,786	4,064
1980	20,270	15,558	11,124	4,434	4,712
1981	24,280	19,002	13,193	5,809	5,278
1982	29,501	23,575	16,793	6,782	5,926
1983	35,364	28,808	21,013	7,795	6,556
1984	39,662	32,723	23,196	9,527	6,939
1985	44,416	37,335	26,586	10,749	7,081
1986	49,773	42,558	30,828	11,730	7,215
1987[E]	53,076	45,329	31,808	13,521	7,747
1988[E]	53,367	43,985	29,761	14,224	9,382

Source: Department of Defense Budget (Annually); NASA Budget (Annually).

[a] Outlays for aircraft and missile procurement. Does not include RDT&E, which DOD has not reported by product group since 1977, and which, for comparability, has been subtracted from data previously reported in this table for earlier years.

[b] Includes Research & Development, and Research & Program Management, and, effective with 1984 data, Space Flight, Control and Data Communications; excludes Construction of Facilities.

[c] 1978 and subsequent years revised by AIA from previously published data to include Navy Weapons Procurement in Missiles Procurement. Beginning 1978, DOD combined Navy Missile Procurement with torpedoes and other related products into Navy Weapons Procurement, of which missiles comprise approximately 80 percent.

[E] Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE[a]

Fiscal Years 1979-1988 (Millions of Dollars)

	1979	1980	1981
TOTAL[d]	$113,672	$130,976	$153,838
Procurement—TOTAL	$25,404	$29,021	$35,191
Aircraft	8,836	11,124	13,193
Missiles[b]	3,786	4,434	5,809
Ships	4,553	4,222	5,218
Weapons[b]	1,248	1,249	1,848
Ammo	958	1,271	1,368
Communications & Electronics[c]	1,618	1,976	2,399
Other	4,405	4,745	5,355
Military Personnel—TOTAL	37,345	40,897	47,941
Active Forces	26,300	28,465	33,378
Reserve Forces	2,107	2,376	3,031
Retired Pay	10,279	11,920	13,729
Adjustment: Retirement Trust Fund Accrual[d]	(1,341)	(1,864)	(2,197)
Research, Development, Test, & Evaluation	11,152	13,127	15,278
Operations & Maintenance	36,424	44,770	51,864
Military Construction	2,080	2,450	2,458
Family Housing	1,468	1,680	1,721
Other	(201)	(969)	(614)

Source: Department of Defense Budget (Annually) and "Status of Funds" (Annual Summaries).

NOTE: Data in parentheses are credit items. Detail may not add to totals because of rounding.

[a] Includes all items in the DOD military budget; excludes the DOD civil budget for the Army Corps of Engineers and other non-defense-related activities.

[b] Beginning in 1978, DOD combined Navy Missiles Procurement with torpedoes and other related products into Navy Weapons Procurement. Missiles comprise approximately 80 percent of the value of this category.

[c] Not available as separate item after 1982; included in Other Procurement.

[d] Beginning in FY1985, the Federal Budget reflects establishment of a military retirement trust fund. Data for previous years have been adjusted on a comparable basis.

[E] Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE
MILITARY OUTLAYS BY FUNCTIONAL TITLE[a] (Continued)

Fiscal Years 1979-1988
(Millions of Dollars)

1982	1983	1984	1985	1986	1987^{E}	1988^{E}
$180,741	$204,430	$220,840	$245,371	$265,636	$274,200	$289,300
$ 43,271	$ 53,624	$ 61,879	$70,381	$76,517	$82,695	$82,798
16,793	21,013	23,196	26,586	30,828	31,808	29,761
6,782	7,795	9,527	10,749	11,730	13,521	14,224
6,739	7,504	8,487	9,145	9,501	10,010	10,344
2,144	3,420	3,691	3,801	4,343	4,470	4,499
1,647	1,966	1,826	2,080	1,933	1,970	2,033
2,733	} 11,926	} 15,152	} 18,020	} 18,182	} 20,916	} 21,937
6,433						
55,170	60,886	64,158	67,842	71,511	70,808	75,677
38,522	41,015	42,732	60,344	63,139	62,784	67,000
3,818	4,508	4,923	7,498	8,373	8,024	8,677
14,938	15,945	16,503	(*d*)	(*d*)	(*d*)	(*d*)
(2,109)	(583)	(2)	—	—	—	—
17,729	20,554	23,117	27,103	32,283	34,178	38,266
59,674	64,915	67,369	72,348	75,259	76,714	81,368
2,922	3,524	3,706	4,260	5,067	4,952	5,186
1,993	2,126	2,413	2,642	2,819	2,767	3,012
(18)	(1,198)	(1,801)	794	1,455	4,374	—

FEDERAL PRICE DEFLATORS FOR GNP, DEFENSE, PPI and CPI

1961-1988

Year	GNP		Federal Gov't Defense Purchases		PPI Capital Equip. (CY 1982 = 100)	CPI (Urban) All Items (CY 1982 = 100)
	FY GNP (FY 1982 = 100)	CY GNP (CY 1982 = 100)	Durables (FY 1982 = 100)	Goods & Services (CY 1982 = 100)		
1961	31.44	31.2	32.96	NA	32.8	31.0
1962	32.00	31.9	33.54		33.0	31.3
1963	32.58	32.4	34.65		33.1	31.7
1964	33.05	32.9	34.67		33.4	32.1
1965	33.76	33.8	35.24		33.8	32.7
1966	34.74	35.0	36.12		34.6	33.6
1967	35.93	35.9	37.67		35.8	34.6
1968	37.19	37.7	39.07		37.0	36.0
1969	39.20	39.8	40.50		38.3	38.0
1970	41.48	42.0	42.26		40.1	40.2
1971	43.66	44.4	44.54		41.7	42.0
1972	46.06	46.5	46.58	41.8	42.8	43.3
1973	48.35	49.5	48.71	45.3	44.2	46.0
1974	52.16	54.0	51.32	50.6	50.5	51.1
1975	57.52	59.3	56.34	55.6	58.2	55.8
1976	62.08	63.1	59.80	59.3	62.1	59.0
1977	67.03	67.3	63.89	63.4	66.1	62.8
1978	71.72	72.2	67.66	67.8	71.3	67.6
1979	77.90	78.6	73.86	74.2	77.5	75.2
1980	84.74	85.7	82.02	83.4	85.8	85.4
1981	93.22	94.0	91.36	92.9	94.6	94.2
1982	100.00	100.0	100.00	100.0	100.0	100.0
1983	104.25	103.8	104.58	104.0	102.8	103.2
1984	108.38	108.1	107.49	107.6	105.2	107.6
1985	112.01	111.5	108.38	110.0	107.6	111.4
1986^p	115.29	114.6	109.42	110.9	110.0	113.6
1987^E	118.88	118.4	113.07	NA	NA	NA
1988^E	123.08	122.6	117.36	NA	NA	NA

Source: GNP and Defense Purchases from U.S. Department of Commerce, Bureau of Economic Analysis; PPI-Capital Equipment Deflator and CPI Deflator from U.S. Department of Labor, Bureau of Labor Statistics, 1967 = 100, converted to 1972 base year by AIA. Estimates from Economic Assumptions of the Budget of the United States Government (latest year).

p Preliminary.
E Estimate.
NA Not Available
Key: CY = Calendar Year.
FY = Fiscal Year.
GNP = Gross National Product.
PPI = Producer Price Index for Capital Equipment.
CPI = Consumer Price Index (for all items), for All Urban Consumers for 1978 and subsequent years, and for All Urban Wage Earners for prior years.

FEDERAL PRICE DEFLATORS FOR AEROSPACE INDUSTRY[r]

Calendar Years 1963-1987

Year	Aerospace Deflators (CY 1982 = 100)[a]						
	Composite	SIC 3721	SIC 3724	SIC 3728	SIC 3761	SIC 3764	SIC 3769
1963	29.6	31.2	26.6	31.1	29.7	26.2	27.3
1964	29.8	30.7	27.5	31.3	30.1	27.2	27.4
1965	30.3	31.4	27.8	31.9	30.5	27.4	28.3
1966	31.2	35.7	28.5	32.8	31.9	28.1	29.2
1967	32.3	33.1	29.3	33.6	33.4	29.0	30.1
1968	33.3	34.2	29.9	34.5	34.8	29.5	31.0
1969	34.6	35.6	31.3	35.6	36.1	30.9	32.4
1970	36.6	37.7	32.9	37.4	38.1	32.5	34.2
1971	38.0	39.3	34.2	38.8	39.7	33.7	35.7
1972	38.4	44.5	35.3	43.4	42.5	35.4	38.1
1973	42.9	45.9	36.3	45.2	42.2	36.6	39.5
1974	47.2	49.9	41.0	52.2	44.5	41.7	44.0
1975	53.0	53.8	49.6	61.2	48.4	50.6	52.2
1976	58.0	58.8	53.9	67.0	53.9	55.4	56.7
1977	62.1	62.6	57.6	69.6	59.5	59.9	61.4
1978	65.4	66.1	64.1	65.5	65.0	65.4	66.1
1979	72.3	72.8	71.5	69.9	74.6	72.0	72.7
1980	80.3	81.2	77.8	77.4	84.4	80.8	80.9
1981	90.4	90.0	90.4	88.8	93.2	92.1	89.5
1982	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	104.9	105.2	105.0	104.2	105.4	104.4	102.8
1984[r]	112.1	115.3	115.1	111.0	106.9	105.9	103.3
1985	112.0	112.6	116.4	112.0	108.9	105.9	108.4
1986[p]	113.7	116.0	116.7	113.0	109.4	108.4	108.9
1987[E]	115.6	117.2	117.9	114.5	112.7	111.7	112.2

Source: U.S. Department of Commerce, Bureau of Economic Analysis and International Trade Administration.

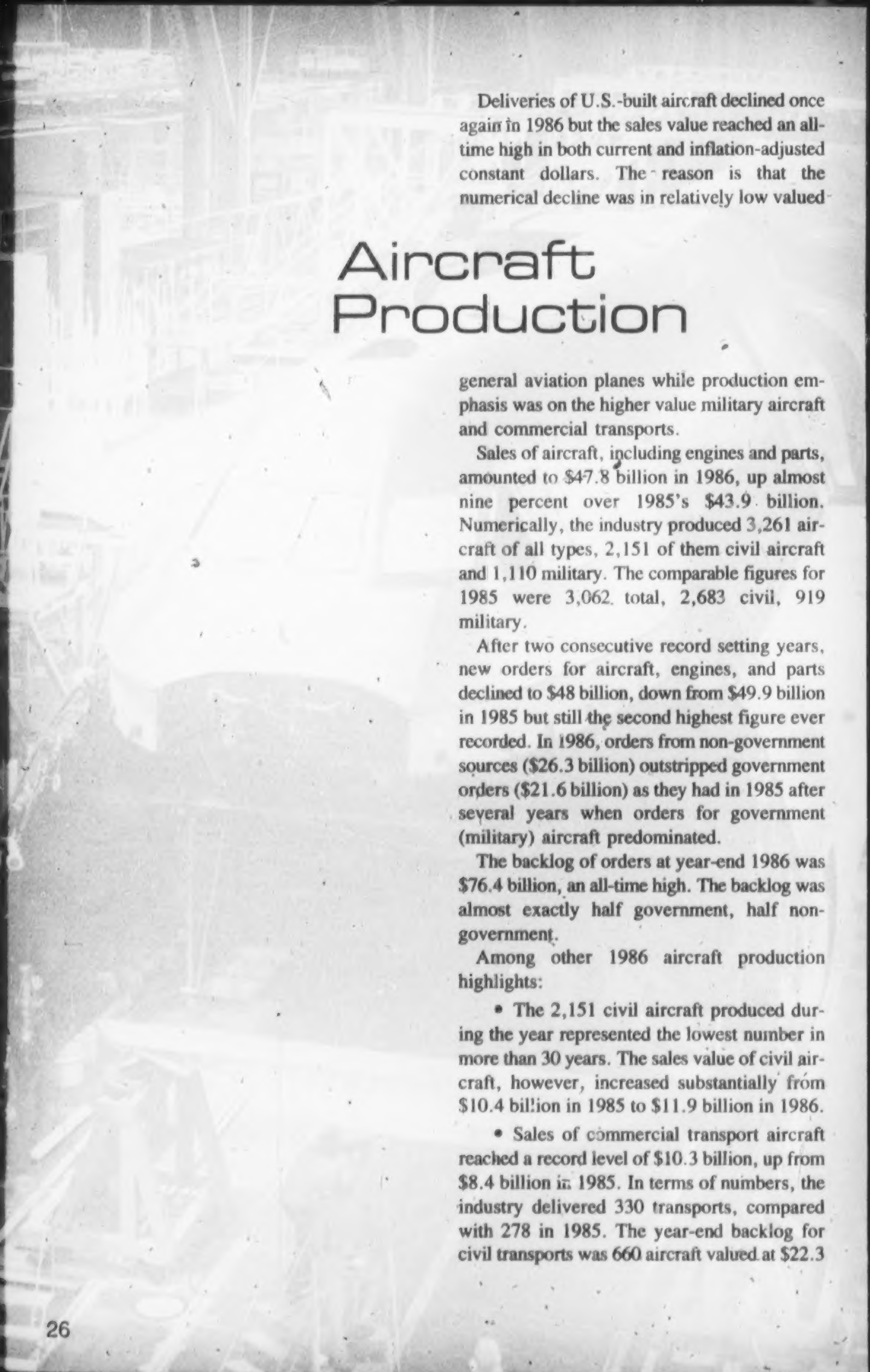
[a] Reported by Dept. of Commerce with 1982 base year; years prior to 1972 converted to 1982 base year for comparability.

[p] Preliminary

[r] Revised.

[E] Estimate.

Key: SIC = Standard Industrial Classification. SIC 3721 = Aircraft; SIC 3724 = Aircraft Engines and Engine Parts; SIC 3728 = Aircraft Parts; SIC 3761 = Missiles and Space Vehicles; SIC 3764 = Space Propulsion; SIC 3769 = Space Equipment not elsewhere classified. Aerospace Composite aggregated by weighting individual SIC categories according to constant dollar value of industry shipments.



Deliveries of U.S.-built aircraft declined once again in 1986 but the sales value reached an all-time high in both current and inflation-adjusted constant dollars. The reason is that the numerical decline was in relatively low valued general aviation planes while production emphasis was on the higher value military aircraft and commercial transports.

Aircraft Production

Sales of aircraft, including engines and parts, amounted to $47.8 billion in 1986, up almost nine percent over 1985's $43.9 billion. Numerically, the industry produced 3,261 aircraft of all types, 2,151 of them civil aircraft and 1,110 military. The comparable figures for 1985 were 3,062 total, 2,683 civil, 919 military.

After two consecutive record setting years, new orders for aircraft, engines, and parts declined to $48 billion, down from $49.9 billion in 1985 but still the second highest figure ever recorded. In 1986, orders from non-government sources ($26.3 billion) outstripped government orders ($21.6 billion) as they had in 1985 after several years when orders for government (military) aircraft predominated.

The backlog of orders at year-end 1986 was $76.4 billion, an all-time high. The backlog was almost exactly half government, half non-government.

Among other 1986 aircraft production highlights:

- The 2,151 civil aircraft produced during the year represented the lowest number in more than 30 years. The sales value of civil aircraft, however, increased substantially from $10.4 billion in 1985 to $11.9 billion in 1986.
- Sales of commercial transport aircraft reached a record level of $10.3 billion, up from $8.4 billion in 1985. In terms of numbers, the industry delivered 330 transports, compared with 278 in 1985. The year-end backlog for civil transports was 660 aircraft valued at $22.3

billion; the figures compare with 662 transports worth $19.5 billion at the end of 1985. The backlog of orders from foreign customers climbed significantly; on the books at year-end 1986 were foreign orders for 293 aircraft valued at 12.5 billion, compared with the prior year's backlog of 252 airplanes worth $7.9 billion.

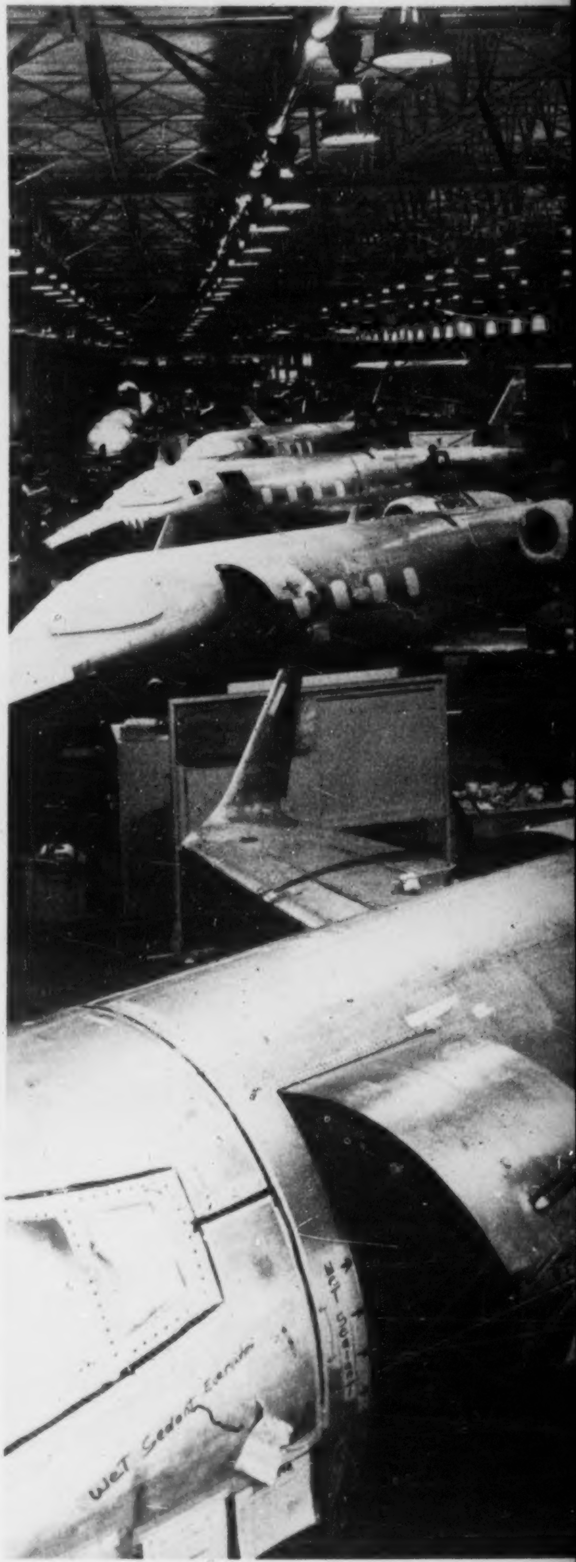
- Production of civil helicopters—326 units—was down by 50 from the preceding year and the dollar value dropped from $505 million in 1985 to $287 million in 1986.

- The plummeting numerical curve for sales of general aviation aircraft, in evidence since 1978, continued to fall in 1986 with shipments of only 1,495 planes, a dip of 534 units from the 1985 level. The dollar value of the shipments declined to $1.3 billion, less than half that of the peak year 1981 when sales of $2.9 billion were recorded.

- Production of 1,110 military aircraft reversed a trend with respect to total numbers; production had been in decline for the three prior years. The 1986 gain resulted from increased deliveries of aircraft in both the U.S. military agencies and export categories. Deliveries to the U.S. military services in 1986 totaled 717, up from 643 in 1985. Military exports numbered 393, up from 276. The latter figure was composed of 115 aircraft shipped abroad under Foreign Military Sales (FMS) programs and 278 sold under direct commercial contracts with foreign governments.

- A breakdown of the 717 aircraft retained for service with U.S. military forces shows that the Air Force took delivery of 303 planes (196 of them fighter/attack aircraft), the Navy 217 (also predominantly fighter/attack types) and the Army 197, all helicopters.

- The upward trend in flyaway costs of military aircraft continued. The Air Force's 303 aircraft had a total value of $13.5 billion; This compares with 190 planes worth $6.3 billion in 1985. The Navy's 217 aircraft cost $4.3 billion, compared with $5.1 billion for 282 aircraft in the previous year. The Army's 197 helicopters were valued at $1.5 billion, compared with $1 Billion for 171 aircraft in 1985.



SALES OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years 1972-1986
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
CURRENT DOLLARS							
1972	$10,153	$ 4,954	$ 5,199	$ 3,666	$ 4,085	$1,288	$1,114
1973	12,278	5,539	6,739	4,231	5,322	1,308	1,417
1974	13,542	5,982	7,560	4,562	5,846	1,420	1,714
1975	14,656	6,859	7,797	5,269	6,001	1,590	1,796
1976	15,936	8,314	7,622	6,336	5,900	1,978	1,722
1977	16,378	8,848	7,530	6,855	5,670	1,993	1,860
1978	19,305	8,724	10,581	6,853	7,873	1,871	2,708
1979	24,672	8,649	16,023	6,378	12,701	2,271	3,322
1980	29,524	9,427	20,097	6,724	15,901	2,703	4,196
1981	33,574	12,047	21,527	8,197	16,877	3,850	4,650
1982	31,886	15,120	16,766	10,903	12,316	4,217	4,450
1983	35,879	17,074	18,805	12,898	14,419	4,176	4,386
1984	37,285	20,216	17,069	15,136	13,121	5,080	3,948
1985	43,940	21,899	22,041	17,783	16,466	4,116	5,575
1986	47,757	22,755	25,002	18,788	19,177	3,967	5,825
CONSTANT DOLLARS (1982 = 100)[a]							
1972	$26,440	$12,901	$13,539	$ 9,547	$10,638	$3,354	$2,901
1973	28,620	12,911	15,709	9,862	12,406	3,049	3,303
1974	28,691	12,674	16,017	9,665	12,386	3,008	3,631
1975	27,653	12,942	14,711	9,942	11,323	3,000	3,389
1976	27,476	14,334	13,141	10,924	10,172	3,410	2,969
1977	26,374	14,248	12,126	11,039	9,130	3,209	2,995
1978	29,518	13,339	16,179	10,479	12,038	2,861	4,141
1979	34,124	11,963	22,162	8,822	17,567	3,141	4,595
1980	36,767	11,740	25,027	8,374	19,802	3,366	5,225
1981	37,139	13,326	23,813	9,067	18,669	4,259	5,144
1982	31,886	15,120	16,766	10,903	12,316	4,217	4,450
1983	34,203	16,276	17,927	12,296	13,745	3,981	4,181
1984[r]	33,260	18,034	15,227	13,502	11,705	4,532	3,522
1985[r]	39,232	19,553	19,679	15,878	14,702	3,675	4,978
1986	42,003	20,013	21,989	16,524	16,866	3,489	5,123

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] Based on revised aerospace composite price deflator; detail may not add to totals because of rounding.

[r] Revised.

ORDERS AND BACKLOG OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years, 1972-1986
(Millions of Current Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
NET NEW ORDERS							
1972	$11,505	$ 5,760	$ 5,745	$ 4,495	$ 4,317	$1,265	$1,428
1973	13,011	6,327	6,684	4,838	5,199	1,489	1,485
1974	16,568	7,956	8,612	5,948	6,467[a]	2,008	2,145[a]
1975	14,157	7,821	6,336	6,314	4,758[a]	1,507	1,578[a]
1976	17,923	9,513	8,410	7,498	6,316[a]	2,015	2,094[a]
1977	20,562	9,369	11,193	6,507	8,406	2,862	2,787
1978	28,111	11,150	16,961	9,055	14,229	2,095	2,732
1979	39,457	8,762	30,695	8,762	25,084[a]	2,348	5,611[a]
1980	34,678	16,555	18,123	11,606	14,427	4,949	3,696
1981	34,857	16,946	17,911	11,760	12,621	5,186	5,290
1982	34,138	20,547	13,591	15,978	10,540	4,569	3,051
1983	38,599	22,171	16,428	17,402	11,688	4,769	4,740
1984	47,240	25,829	21,411	19,228	18,286	6,601	3,125
1985	49,942	23,751	26,191	20,062	20,153	3,689	6,038
1986	47,957	21,642	26,315	17,361	20,083	4,281	6,232
BACKLOG AS OF DECEMBER 31							
1972	$15,632	$ 7,027	$ 8,605	$ 5,705	$ 7,355	$1,322	$1,250
1973	16,365	7,815	8,550	6,312	7,232	1,503	1,318
1974	19,391	9,789	9,602	7,698	7,791	2,091	1,811
1975	18,892	10,751	8,141	8,743	6,646	2,008	1,495
1976	20,879	11,950	8,929	9,905	7,416	2,045	1,513
1977	25,063	12,471	12,592	9,557	10,152	2,914	2,440
1978	33,869	14,897	18,972	11,759	16,508	3,138	2,464
1979	50,484	17,316	33,168	13,331	27,955	3,985	5,213
1980	57,235	17,435	39,800	12,702	33,258	4,733	6,542
1981	56,314	21,292	35,022	15,626	27,683	5,666	7,339
1982	58,564	26,644	31,920	20,626	25,980	6,018	5,940
1983	60,372	30,688	29,684	24,091	23,377	6,597	6,307
1984	70,327	36,312	34,015	28,183	28,542	8,129	5,473
1985	76,191	38,150	38,041	30,462	32,091	7,688	5,950
1986	76,391	37,041	39,350	29,035	32,997	8,006	6,353

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] AIA estimate, based on MQ37D data.

U.S. AIRCRAFT PRODUCTION—CIVIL

Calendar Years 1969-1986

Year	TOTAL	Domestic Shipments			Export Shipments		
		Transports[a]	Helicopters	General Aviation	Transports	Helicopters	General Aviation
1969	13,505	332	282	9,996	182	252	2,461
1970	8,076	127	150	5,246	184	332	2,037
1971	8,158	50	171	5,900	173	298	1,566
1972	10,576	79	319	7,702	148	256	2,072
1973	14,709	143	342	10,482	151	428	3,163
1974	15,326	91	433	9,903	241	395	4,263
1975	15,251	127	528	10,804	188	336	3,268
1976	16,429	64	442	12,232	158	315	3,218
1977	17,913	54	527	13,441	101	321	3,469
1978	18,962	130	536	14,346	111	368	3,471
1979	18,460	176	570	13,177	200	459	3,878
1980	13,634	150	841	8,703	237	525	3,178
1981	10,916	132	619	6,840	255	453	2,617
1982	5,085	111	333	3,326	121	254	940
1983	3,356	133	187	2,172	129	216	519
1984	2,999	102	143	2,013	83	233	425
1985	2,683	126	239	1,545	152	137	484
1986	2,151	171	116	798	159	210	464

Source: Civil shipments data from company reports to AIA and General Aviation Manufacturers Association. Export data from Dept. of Commerce (Bureau of Census) Report FT410.

[a] Prior to 1976, includes the C-130 military transport.

U.S. AIRCRAFT PRODUCTION—MILITARY

Calendar Years 1969-1986

MILITARY AIRCRAFT

Year	TOTAL	U.S. Military Agencies	Exports		
			Total	FMS[a]	Direct[b]
1969	4,290	3,644	646	NA	NA
1970	3,720	3,085	635	NA	NA
1971	2,914	2,232	682	NA	NA
1972	2,530	1,993	537	124	413
1973	1,821	1,243	578	129	449
1974	1,513	799	714	365	349
1975	1,779	844	935	525	410
1976	1,318	625	693	518	175
1977	1,134	454	680	408	272
1978	996	467	529	256	273
1979	837	531	306	203	103
1980	1,047	625	422	194	228
1981	1,062	703	359	215	144
1982	1,159	690	469	68	401
1983	1,053	766	287	70	217
1984	936	561	375	71	304
1985[r]	919	643	276	134	142
1986	1,110	717	393	115	278

Source: Military acceptances for use of U.S. military agencies and for reimbursable programs reported by USAF, USN and Army. Export data from Dept. of Commerce (Bureau of the Census) Report FT 410.

[a] Also includes acceptances of NATO AWACS aircraft.

[b] Military aircraft exported via commercial contracts, directly from manufacturers to foreign governments.

[r] Revised.

NA Not available.

CIVIL AIRCRAFT SHIPMENTS
Calendar Years 1972-1986

Year	TOTAL	Transport Aircraft[a]	Helicopters	General Aviation
NUMBER OF AIRCRAFT SHIPPED				
1972	10,576	227	575	9,774
1973	14,709	294	770	13,645
1974	15,326	332	828	14,166
1975	15,251	315	864	14,072
1976	16,429	222	757	15,450
1977	17,913	155	848	16,910
1978	18,962	241	904	17,817
1979	18,460	376	1,029	17,055
1980	13,634	387	1,366	11,881
1981	10,916	387	1,072	9,457
1982	5,085	232	587	4,266
1983	3,356	262	403	2,691[b]
1984	2,999	185	376	2,438
1985	2,683	278	376	2,029
1986	2,151	330	326	1,495
VALUE—Millions of Dollars				
1972	$ 3,308	$2,660	$ 90	$ 558
1973	4,665	3,718	121	826
1974	5,091	3,993	189	909
1975	5,086	3,779	274	1,033
1976	4,592	3,078	285	1,229
1977	4,451	2,649	251	1,551
1978	6,458	4,308	328	1,822
1979	10,644	8,030	403	2,211
1980	13,058	9,895	656	2,507
1981	13,223	9,706	597	2,920
1982	8,610	6,246	365	1,999
1983	9,773	8,000	303	1,470[b]
1984	7,717	5,689	330	1,698
1985[r]	10,384	8,448	505	1,431
1986	11,857	10,308	287	1,262

Source: Transport Aircraft and Helicopters: Aerospace Industries Association, company reports.
General Aviation: General Aviation Manufacturers' Association and Aerospace Industries Association.

[a] U.S.-manufactured fixed-wing aircraft over 33,000 pounds empty weight, including all jet transports plus the four-engine turboprop-powered Lockheed L-100.

[b] Includes 3 off-the-shelf Gulfstream G-III's delivered to the U.S. Air Force for C-20 VIP transports.

[r] Revised.

CIVIL TRANSPORT AIRCRAFT BACKLOG[a]

As of December 31, 1982-1986

Company and Model	1982	1983	1984	1985	1986
TOTAL AIRCRAFT ON ORDER					
(Domestic and Foreign Orders)	455	352	489	662	660
Value (Millions of Dollars)	$16,321	$12,591	$16,588	$19,519	$22,264
Boeing—TOTAL	356	273	345	472	451
B-727	19	8	—	—	—
B-737	93	93	170	304	269
B-747	26	22	38	51	84
B-757	80	58	62	77	63
B-767	138	92	75	40	35
Lockheed—TOTAL	11	1	2	2	—
L-1011	7	1	2	—	—
L-100	4	—	—	2	—
McDonnell Douglas—TOTAL	88	78	142	188	209
DC-9/MD-80	85	78	137	180	203
DC-10	3	—	5	8	6
TOTAL FOREIGN ORDERS	196	139	167	252	293
Value (Millions of Dollars)	$ 7,322	$ 5,420	$6,941	$7,929	$12,467
Boeing—TOTAL	142	100	120	158	192
B-727	1	—	—	—	—
B-737	45	29	45	98	93
B-747	26	18	38	38	68
B-757	22	16	7	8	9
B-767	48	37	30	16	22
Lockheed—TOTAL	9	1	2	2	—
L-1011	5	1	2	—	—
L-100	4	—	—	2	—
McDonnell Douglas—TOTAL	45	38	45	90	101
DC-9/MD-80	42	38	45	90	99
DC-10	3	—	—	—	2

Source: Aerospace Industries Association, company reports.

[a] Unfilled firm orders on the books, excluding options, and new aircraft contracted for lease from manufacturer to customer; for U.S. manufactured transport aircraft over 33,000 lbs. including all jet transports plus the turboprop-powered Lockheed L-100.

SHIPMENTS OF CIVIL TRANSPORT AIRCRAFT[a]

Calendar Years 1982-1986

Company and Model	1982	1983	1984	1985	1986
TOTAL					
Number of Aircraft Shipped	232	262	185	278	330
Value (Millions of Dollars)	$6,246	$8,000	$5,689	$8,500	$10,308
Boeing—TOTAL	169	196	138	200	238
B-707	1	—	—	—	—
B-727	26	11	8	—	—
B-737	95	82	67	115	141
B-747	25	23	16	24	35
B-757	2	25	18	36	35
B-767	20	55	29	25	27
Lockheed—TOTAL	17	11	7	7	1
L-1011	14	6	4	2	—
L-100	3	5	3	5	1
McDonnell Douglas—TOTAL	46	55	40	71	91
DC-9/MD-80	41	51	38	71	86
DC-10	5	4	2	—	5

Source: Aerospace Industries Association, company reports.

[a] U.S.-manufactured fixed-wing aircraft over 33,000 lbs. empty weight; all are jet-powered except the four-engine turboprop-powered Lockheed L-100.

SPECIFICATIONS OF U.S. CIVIL JET TRANSPORT AIRCRAFT[a]

On Order or In Production as of 1986

Number of Engines and Crew, and Model Designation[b]	Initial Service	Standard Mixed Class	Operating Empty Weight (000's lbs)	Maximum Takeoff Gross Weight (000's lbs)	Range (Nautical Miles)[c]	Engines (Manufacturer[d] and Model)
FOUR ENGINES/CREW OF 3						
747-200B*	1971	452	374	775-833	5,350	P&W JT9D-7R4G2
747SP*	1976	331	333	700	7,670	R-R RB.211-524D4
747-300B*	1983	496	383	775-833	7,310	P&W JT9D-7R4G2
747-400	1988	509	390	870	8,380	P&W 4000 or GE CF6-80C2
THREE ENGINES/CREW OF 3						
DC-10-10*	1971	250	243	440	3,750	GE CF6-6D
DC-10-15*	1981	278	249	455	4,422	GE CF6-50C2-F
DC-10-30*	1972	275	267	580	6,357	GE CF6-50C2
DC-10-40*	1972	275	271	580	5,988	P&W JT9D-59A
TWO ENGINES/CREW OF 2						
737-200	1971	110	61	116-119	1,800	P&W JT8D-9A/15/17/17R
737-300	1984	141	69	125-136	2,300	CFMI-CFM56-3
737-400	1988	159	73	139	2,250	CFMI-CFM56-3B2
757-200	1982	186	128	220-240	4,550	RR RB211-535C/E4 or P&W 2037
767-200*	1982	216	176	315	4,566	P&W JT9D-7R4 or GE CF6-80A
767-200ER*	1984	216	180	351	5,942	P&W JT9D-7R4 or GE CF6-80A
767-300*	1986	261	190	351	4,650	P&W JT9D-7R4 or GE CF6-80A
767-300ER	1987	261	196	400	6,650	P&W 4000 or GE CF6-80C2
MD-80:						
MD-81	1980	142	78	140	1,700	P&W JT8D-209
MD-82	1981	142	78	149	2,080	P&W JT8D-217A
MD-83	1985	142	80	160	2,590	P&W JT8D-219
MD-87	1987	130	73	140	2,740	P&W JT8D-217C
MD-88	1987	142	78	150	2,150	P&W JT8D-217C

Source: Aerospace Industries Association, based on company reports.

[a] All jet-powered passenger transport aircraft 33,000 pounds or more empty weight.

[b] Manufacturers are The Boeing Company (727, 737, 747, 757, and 767), Lockheed Corporation (L-1011), and McDonnell Douglas Corporation (MD-80 and DC-10).

[c] Full passenger load and baggage.

[d] P&W = Pratt and Whitney Aircraft Company of United Technologies Corporation; GE = General Electric Company; RR = Rolls-Royce Limited; CFMI = General Electric/Snecma.

* Wide-body aircraft.

SPECIFICATIONS OF U.S. CIVIL HELICOPTERS

In Production as of 1986

Company	Commercial Model	Number of Places	Useful load (Lbs.)	Range with Useful Load (N. Miles)	External Cargo Payload (Lbs.)
Bell Helicopter Textron Textron Inc.	206 Series	4-5	1315-1630	240-304	1200-1500
	206L Series	7	1894-1931	297-308	2000
	212	15	5238	226	5000
	214 Series	16-18	5450-8035	219-435	6000-8000
	222	7-10	2985	356	2500
	412	15	5333	232	5000
Boeing Vertol Company	234 (LR)	47	23,300	620	28,000
	234 (UT)	3	30,000	264	28,000
The Enstrom Helicopter Corp.	F-28 Series	3	700-850	238-272	500-1000
	280 Series	3	700-850	243-272	500-1000
Hiller Helicopters Rogerson Aircraft Corp.	12-E Series	3-4	1264-1341	215	1000
	12-ET Series	3-4	1450	351	1000
	RH-1100	5	1355	396	1500
Hynes Helicopter, Inc.	B-2B	2	670	225	400
	305	5	1200	275	800
McDonnell Douglas Helicopter Co.[b]	300 Series[a]	3	698-1004	191-224	1104
	500 Series	4-7	1320-1660	276-287	1560-2000
Robinson Helicopter Co.	R22	2	468	208	—
Schweizer Aircraft Corp.	300C[a]	3	698-1004	191-224	1104
Sikorsky Aircraft Div. United Technologies Corp.	S-76 (MARK II)	14	4525	466	4200
	S-70C Commercial Utility	19	11,862	297	8000

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada, Mexico and Puerto Rico, 1982/83" and "AIA Directory of VTOL Aircraft, 1983."

[a] In 1983, Schweizer Aircraft became the licensed manufacturer for the Hughes 300C, redesignated the Schweizer-Hughes 300C, with product support beginning in 1983, and production beginning in 1984.

[b] McDonnell Douglas Corporation acquired Hughes Helicopters in January 1984.

CIVIL HELICOPTER SHIPMENTS[a]

Calendar Years 1982-1986

Company and Model	1982	1983	1984	1985	1986
CIVIL SHIPMENTS	587	403	376	376	326
Value (Millions of Dollars)	$365	$303	$330	$505	$287
Bell—TOTAL	272	159	151	146	125
206 series	193	107	94	87	67
212	32	6	18	8	11
214 series	10	11	13	10	15
222	15	17	26	22	20
412	22	18	—	19	12
Boeing Vertol—TOTAL	1	4	—	4	—
234	1	4	—	4	—
Enstrom—TOTAL	24	9	5	18	10
F-28 series	17	8	2	11	3
280 series	7	1	3	7	7
Hiller—TOTAL	12	7	—	2	—
12-E series	6	6	—	2	—
12-ET series	3	1	—	—	—
FH/H-1100	3	—	—	—	—
McDonnell Douglas[c]—TOTAL	162	137	92	56	65
300 series	54	67	(b)	(b)	(b)
269 series	—	—	—	—	1
500 series	108	70	85	48	40
530 series	—	—	7	8	24
Robinson—TOTAL	88	64	79	79	90
R22	88	64	79	79	90
Schweizer—TOTAL	—	—	11	24	23
300C[b]	—	—	11	24	23
Sikorsky (UTC)—TOTAL	28	23	38	47	13
S-76	28	23	27	19	10
S-70A	—	—	2	—	—
S-70B-3	—	—	—	2	—
S-70C-series	—	—	9	26	3

Source: Aerospace Industries Association, company reports.

NOTE: All data exclude production by foreign licensees.

[a] Domestic and export helicopter shipments for non-military use. The data in this table have been revised to separate out direct military exports (involving commercial contracts between U.S. manufacturers and foreign governments) which are now reported elsewhere in this chapter. Models which may be shipped in either a civil or a military configuration appear in both tables.

[b] Beginning with 1984 production, Schweizer Aircraft became the licensed manufacturer for the Hughes 300C, redesignated the Schweizer-Hughes 300C.

[c] Formerly models manufactured by Hughes.

DIRECT EXPORT SHIPMENTS OF MILITARY HELICOPTERS[a]

Calendar Years 1982-1986

Model	1982	1983	1984	1985	1986
DIRECT MILITARY EXPORT SHIPMENTS	42	54	31	38	10
Value (Millions of Dollars)	$77	$90	$59	$75	$77
Bell AH-1S	—	15	—	10	—
Boeing Vertol CH-47/414/352	8	—	3	3	6
Hiller 12-E	20	—	—	—	—
Hughes 500MD (TOW)/ 500 Scout	14	26	24	25	—
Schweizer 300C	—	—	—	—	4
Sikorsky S-76	—	13	4	—	—

Source: Aerospace Industries Association, company reports.

[a] Shipments of helicopters in military configuration exported directly from U.S. manufacturers to foreign governments. Military helicopters exported via Foreign Military Sales (FMS) are reported with Dept. of Defense (DOD) aircraft acceptance data elsewhere in this chapter. Some models reported on this page may be shipped in either military or civil configuration; see Civil Helicopter Shipments table for additional data.

GENERAL AVIATION AIRCRAFT SHIPMENTS

By Selected Manufacturers
Calendar Years 1982-1986

	1982	1983	1984	1985	1986
NUMBER OF AIRCRAFT SHIPPED	4,266	2,691[b]	2,438	2,029	1,495
Agricultural	174	1,811	1,621	1,370	985
Single-Engine, Piston	2,697				
Multi-Engine, Piston	678	417	374	193	138
Turboprop	458	321	272	321	250
Turbojet	259	142[b]	171	145	122
VALUE OF SHIPMENTS[a] (Millions of Dollars)	$1,999	$1,470[b]	$1,698	$1,431	$1,262
Agricultural	$ 199	$ 145	$ 149	$ 124	$ 80
Single-Engine, Piston					
Multi-Engine, Piston	220	115	135	56	43
Turboprop	590	460	443	542	430
Turbojet	990	750[b]	971	709	709
Number of Aircraft By Selected Manufacturer					
Ayres	25	9[c]	(c)	(c)	(c)
Beech	526	402	411	288	305
Cessna	2,140	1,219	978	881	549
Fairchild	49	39	29	35	37
Gates Learjet	99	45	33	33	20
Gulfstream	96	71[b]	58	55	26
Lake	22	28	26	20	26
Maule	39	36	65	88	64
Mooney	188	154	151	90	142
Piper	1,048	661	664	538	326
Schweizer Aircraft	34	27	23	(d)	(d)

Source: General Aviation Manufacturers' Association and Aerospace Industries Association.

[a] Manufacturers' net billing price.

[b] Includes 3 off-the-shelf Gulfstream G-3's delivered to the U.S. Air Force for C-20 VIP transports.

[c] Data not reported after August 1983.

[d] Data not reported after 1984.

MILITARY AIRCRAFT ACCEPTED BY U.S. MILITARY AGENCIES

Number and Flyaway Value
Calendar Years 1972-1986

Year	TOTAL	Bomber/ Patrol/ Command/ Control	Fighter/ Attack	Trans-port/ Tanker	Trainer	Heli-copter	Other
NUMBER							
1972	2,117	13	563	29	148	1,312	52
1973	1,372	30	422	22	90	808	—
1974	1,110	50	478	27	49	506	—
1975	1,369	62	624	34	40	601	8
1976	1,143	55	646	67	11	348	16
1977	862	44	488	25	12	273	20
1978	723	30	478	28	—	166	21
1979	734	17	529	16	—	158	14
1980	819	16	551	15	18	189	30
1981	918	19	649	17	60	158	15
1982	758	26	478	14	60	172	8
1983	836	34	421	22	120	233	6
1984	632	34	298	18	30	240	12
1985[r]	777	34	409	25	—	306	3
1986	834	43	432	77	—	282	—
FLYAWAY VALUE—Millions of Dollars							
1972	$3,247	$129	$2,068	$536	$100	$ 396	$ 18
1973	2,571	325	1,490	348	140	268	—
1974	2,224	584	1,222	101	111	206	—
1975	3,172	599	2,054	128	27	359	5
1976	4,729	547	3,421	340	27	384	10
1977	4,364	499	3,190	331	14	316	14
1978	4,664	689	3,496	237	—	225	17
1979	5,470	442	4,660	136	—	219	13
1980	6,514	475	5,282	178	32	516	31
1981	8,446	526	6,518	509	32	825	19
1982	8,605	886	6,383	410	42	872	12
1983	9,640	1,259	6,708	575	79	1,009	10
1984	9,308	1,270	5,774	627	18	1,597	22
1985[r]	14,122	3,640	7,923	838	—	1,715	6
1986	21,225	7,727	8,054	3,355	—	2,089	—

Source: Departments of the Army, Navy, and Air Force.

NOTE: Data represent new U.S.-manufactured aircraft, excluding gliders and targets. Values include spares, spare parts, and support equipment that are procured with the aircraft. Includes aircraft accepted for shipment to foreign governments for military assistance programs and foreign military sales. 1972-1975, flyaway value does not include the value of planes produced for the security assistance programs and accepted by the USAF.

[r] Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES AIR FORCE[a]

Calendar Years 1985 and 1986
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1985	1986	1985	1986	1985	1986
AIR FORCE—TOTAL	190	303	$6,324[r]	$13,522	$7,114[r]	$15,825
Fighter/Attack—TOTAL	158	196	2,730	3,116	3,293	3,894
F-15	34	38	963	1,145	1,255	1,498
F-16	124	158	1,767	1,971	2,038	2,396
Bombers—TOTAL	4	26	2,636[r]	6,977	2,810[r]	8,286
B-1B	4	26	2,636[r]	6,977	2,810[r]	8,286
Transports/Tankers—TOTAL	23	77	804	3,355	849	3,501
C-5B	—	9	—	2,334	—	2,478
C-12F[d]	—	40	—	52	—	52
C-130H	12	16	170	250	179	250
KC-10A	11	12	634	719	670	721
Command/Control—TOTAL	5	4	154	74	162	144
TR-1A	5	4	154	74	162	144

Source: Department of the Air Force.

NOTE: Costs shown are approximate. Calendar year acceptances may derive from procurement quantities funded in more than one fiscal year.

[a] Air Force acceptances for own use; exclude FMS/MAP shipments.

[b] Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment and non-recurring costs associated with the manufacture of the aircraft.

[c] Weapon System Cost includes flyaway costs, peculiar ground equipment, training equipment and technical data.

[d] Aircraft previously leased by the Air Force. Purchased in September 1986.

[e] Excludes 3 C-20's (off-the-shelf Gulfstream G-3's) delivered to the Air Force (for VIP transport) and included in civil general aviation shipments.

[r] Revised

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES ARMY[a]

Calendar Years 1985 and 1986
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1985	1986	1985	1986	1985	1986
ARMY—TOTAL	171	197	$996[r]	$1,499	NA	$1,632
Helicopters—TOTAL	168[r]	197	990[r]	1,499	NA	1,632
AH-1S	6	—	24	—	27	—
AH-64	51	117	454	1,159	NA	1,267
UH-60A	111[r]	80	512[r]	340	541[r]	365
Fixed-Wing—TOTAL	3	—	6	—	6	—
C-12	3	—	6	—	6	—

Source: Department of the Army.

[a] Army acceptances for own use; exclude FMS/MAP shipments.

[b] Flyaway cost includes airframes, engines, electronics, communications, armament and other installed equipment.

[c] Weapon System Cost includes flyaway items, initial spares, ground equipment, training equipment and other support items.

[r] Revised

NA Not available

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES NAVY[a]

Calendar Years 1985 and 1986
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1985[r]	1986	1985[r]	1986	1985[r]	1986
NAVY—TOTAL	282	217	$5,142	$4,264	$7,350	$6,255
Patrol—TOTAL	20[r]	7	$ 563	$ 225	$ 968	$ 351
P-3C	6[r]	7	186	225	362	351
E-2C	6	—	201	—	320	—
C-2	8	—	176	—	286	—
Fighter/Attack—TOTAL	162	156	3,935	3,576	5,265	5,032
F-14A	21	27	686	874	851	1,082
F/A-18	103	85	2,419	1,864	3,091	2,478
AV-8B	24	30	533	517	751	720
A-6E	8	6	157	139	242	256
EA-6B	6	8	140	182	330	496
Helicopters—TOTAL	98	54	610	463	1,083	872
AH-1W	—	13	—	7	—	175
CH-53E	10	7	154	90	208	110
TH-57	47	—	31	—	69	—
SH-60B	24	24	302	295	664	504
SH-2F[d]	17	10	123	71	142	83
Support—TOTAL	2	—	34	—	34	—
KC-130T	2	—	34	—	34	—

Source: Department of the Navy.

[a] Navy acceptances for own use; excludes FMS shipments.

[b] Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment, nonrecurring costs and ancillary equipment.

[c] Weapon System Cost (Investment Cost) includes flyaway items, initial spares, ground equipment, training equipment and other support items.

[r] Revised.

NA Not available.

MILITARY AIRCRAFT ACCEPTANCES FOR REIMBURSABLE PROGRAMS[a]

Calendar Years 1985 and 1986
(Millions of Dollars)

Accepting Agency, Type and Model	Number of Aircraft Accepted		Flyaway Cost[b]	
	1985[r]	1986	1985[r]	1986
TOTAL ACCEPTANCES FOR REIMBURSABLE PROGRAMS	134[r]	117	$1,660[r]	$1,940
AIR FORCE—TOTAL	84[r]	63	$1,204[r]	$1,173
Fighter/Attack—TOTAL	81[r]	57	986[r]	722
F-5E	14	6	134	63
F-5F	4	2	42	20
F-15	9	—	250	—
F-16 A/B	53[r]	19	547[r]	181
F-16 C/D	1[r]	30	13[r]	458
Command/Control—TOTAL	3	4	218	428
E-3A (NATO AWACS)	3	4	218	428
Patrol—TOTAL	—	2	—	23
RF-SE	—	2	—	23
NAVY—TOTAL	10[r]	26	$ 341[r]	$ 689
Fighter/Attack—TOTAL	8	23	272	640
A-6 E/F	—	11	—	232
F/A-18	8[r]	12	272[r]	408
Patrol—TOTAL	2	—	69	—
E-2C	2	—	69	—
Helicopters—TOTAL	—	3	—	49
MH-53E	—	3	—	49
ARMY—TOTAL	40	28	$ 115	$ 78
Helicopters—TOTAL	40	28	115	78
UH-1H	15	15	25	25
AH-1S	21	13	87	53
500 ME	4	—	3	—

Source: Departments of the Air Force, Navy, and Army.

[a] Foreign Military Sales and NATO AWACS Program.

[b] Flyaway cost includes airframes, engines, electronics, communications, armament, other installed equipment and nonrecurring costs associated with the manufacture of the aircraft.

[r] Revised.

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a]

Fiscal Years 1986, 1987 and 1988
(Millions of Dollars)

Agency, Type and Model	1986		1987[E]		1988[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
AC-130	1	$ 24.8	—	$ 18.2	5	$ 277.0
ADC Air Defense Competition	—	—	20	402.0	—	—
B-1B	48	4,664.9	—	—	—	—
C-5B Galaxy	16	1,946.8	21	1,883.8	—	—
C-17	—	—	—	49.1	2	684.2
C-20A (C-SAM)	8	145.3	—	—	—	—
C-27 (Stol Intratheater Transport)	—	—	—	—	5	65.9
C-130H Hercules[d]	—	—	16	286.8	—	—
Civil Air Patrol (CAP) Aircraft	78	9.3	38	1.6	38	0.6
F-15 D/E Eagle	48	1,707.0	42	1,643.9	42	1,538.4
F-16 Falcon	180	2,715.2	180	2,707.0	180	2,699.6
KC-10A ATCA Extender	12	392.5	8	87.4	—	—
KC-135 Re-engining/Modern	43	678.5	50	739.5	36	579.2
LANTIRN (Night Precision Attack)	—	420.7	—	761.7	—	741.3
MC-130H Combat Talon[d]	2	67.5	7	300.4	7	372.3
TR-1/U-2[b]	6	263.4	3	87.9	—	10.7
VC-X (Air Force One Replacement)	2	266.3	—	—	—	—
ARMY						
AH-64 Attack Helicopter	116	$1,096.5	101	$1,042.6	67	$ 645.6
C-12	6	11.4	4	11.7	—	—
C-20	—	—	2	40.0	—	—
CH-47 Modernization	—	275.2	—	255.9	—	231.9
EH-60A Quick Fix	18	121.5	18	126.5	—	30.3
F-27	—	—	2	13.6	—	—
OH-58D AHIP Modification	—	178.2	—	146.7	—	48.1
RC-12D Guard Rail	—	—	—	—	3	45.5
RPVs	—	21.9	—	49.0	—	179.4
UH-60A Black Hawk[c]	78	386.1	82	363.4	61	453.4
USMA Military Academy Replacement Aircraft	—	—	—	—	2	0.2
NAVY						
A-6E/F Intruder	11	$ 281.0	11	$ 329.5	12	$ 812.2
AH-1W Super Cobra	22	179.2	—	35.5	22	172.7
AV-8B Harrier	46	740.0	42	653.6	32	628.2
C-2 Greyhound	8	158.8	9	98.9	—	5.8
C-20	2	36.6	—	—	—	—
CH/MH-53E Super Stallion	14	256.9	14	224.9	14	232.5
E-2C Hawkeye	6	319.2	10	436.8	6	400.2

(Continued on next page)

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a] (Continued)

Agency, Type and Model	1986		1987[E]		1988[E]	
	No.	Cost	No.	Cost	No.	Cost
NAVY (Continued)						
E-6A	2	339.5	3	293.3	3	326.9
EA-6B Prowler	12	399.6	12	430.7	6	353.9
EX	—	—	—	—	8	179.8
F-14 A/D Tomcat	18	694.3	15	634.8	12	761.1
F-16N Adversary Aircraft	12	115.6	—	—	—	—
F/A-18 Hornet	84	2,174.9	84	2,305.6	84	2,472.6
P-3C Orion	9	374.6	9	397.3	—	0.1
SH-2F Seasprite (LAMPS MK-I)	6	59.4	6	51.7	—	1.6
SH-60B Seahawk LAMPS	18	262.8	17	213.6	6	125.0
SH-60F CV ASW	—	28.4	7	144.1	18	309.4
T-34C Mentor	19	18.2	—	—	—	—
T-45 Training System	—	—	12	358.2	24	403.5
UH-60A[c]	—	—	4	38.0	3	42.5
UC-12B/CX	12	24.5	—	—	—	—
VH-60[c]	9	102.8	—	24.2	—	—

Source: "Program Acquisition Costs by Weapon System," "Procurement Programs (p-1)" Department of Defense Budget, (Annually).
NOTE See Research and Development Chapter for aircraft program RDT&E authorization data.
a Total Obligational Authority for procurement, excluding initial spares.
b Includes ground stations.
c Army, Navy and Air Force funding.
E Estimate. Latest year reflects Administration's budget proposal.
d Navy and Air Force funding.

ACTIVE U.S. MILITARY AIRCRAFT IN CONTINENTAL U.S. [a]

Fiscal Years 1977-1988

Fiscal Year	Total	Fixed Wing Aircraft				Helicopter
		Total	Jet	Turboprop	Piston	
1977	18,670	11,625	9,168	1,382	1,075	7,045
1978	18,931	11,748	8,898	1,794	1,056	7,183
1979	18,526	11,365	8,656	1,859	850	7,161
1980	18,969	11,362	8,794	1,869	699	7,607
1981	19,363	11,645	9,111	1,943	591	7,718
1982	21,728	12,063	9,647	1,900	516	9,665
1983	18,652	11,603	9,495	1,745	363	7,049
1984	18,833	11,661	9,551	1,777	333	7,172
1985	19,333	11,929	9,640	1,881	408	7,404
1986[p]	20,173	11,930	9,732	1,814	384	8,243
1987[E]	20,532	12,061	9,817	1,871	373	8,471
1988[E]	20,757	12,158	9,896	1,896	366	8,599

Source: Department of Defense, Office of the Secretary of Defense, reported in "FAA Aviation Forecasts" (Annually).
a Includes Army, Air Force, Navy, and Marine regular service aircraft, as well as Reserve and National Guard aircraft.
p Preliminary.
E Estimate.

DEPARTMENT OF DEFENSE OUTLAYS FOR AIRCRAFT PROCUREMENT

By Agency
Fiscal Years 1961-1988
(Millions of Dollars)

Year	TOTAL AIRCRAFT PROCUREMENT	Air Force	Navy	Army
1961	$ 5,898	$ 3,926	$1,832	$ 140
1962	6,659	4,387	2,102	170
1963	6,309	3,747	2,328	234
1964	6,053	3,894	1,859	300
1965	5,200	3,115	1,739	346
1966	6,635	4,074	2,021	540
1967	8,411	4,842	2,607	962
1968	9,462	5,079	3,244	1,139
1969	9,177	5,230	2,821	1,126
1970	7,948	4,623	2,488	837
1971	6,631	3,960	2,125	546
1972	5,927	3,191	2,347	389
1973	5,066	2,396	2,557	113
1974	5,006	2,078	2,806	122
1975	5,484	2,211	3,137	136
1976	6,520	3,323	3,061	136
Tr. Qtr.	1,557	859	672	26
1977	6,608	3,586	2,721	301
1978	6,971	3,989	2,602	380
1979	8,836	5,138	3,140	558
1980	11,124	6,647	3,689	787[r]
1981	13,193	7,941	4,397	855
1982	16,793	9,624	5,872	1,297
1983	21,013	11,799	7,490	1,724
1984	23,196	12,992	8,040	2,165
1985	26,586	15,619	8,263	2,705
1986	30,828	18,919	8,922	2,987
1987[E]	31,808	19,184	9,518	3,107
1988[E]	29,761	17,504	9,406	2,851

Source: Department of Defense Budget (Annually).

NOTE: Detail may not add to totals because of rounding.

[E] Estimate. Latest year reflects Administration's budget proposal.

[r] Revised.

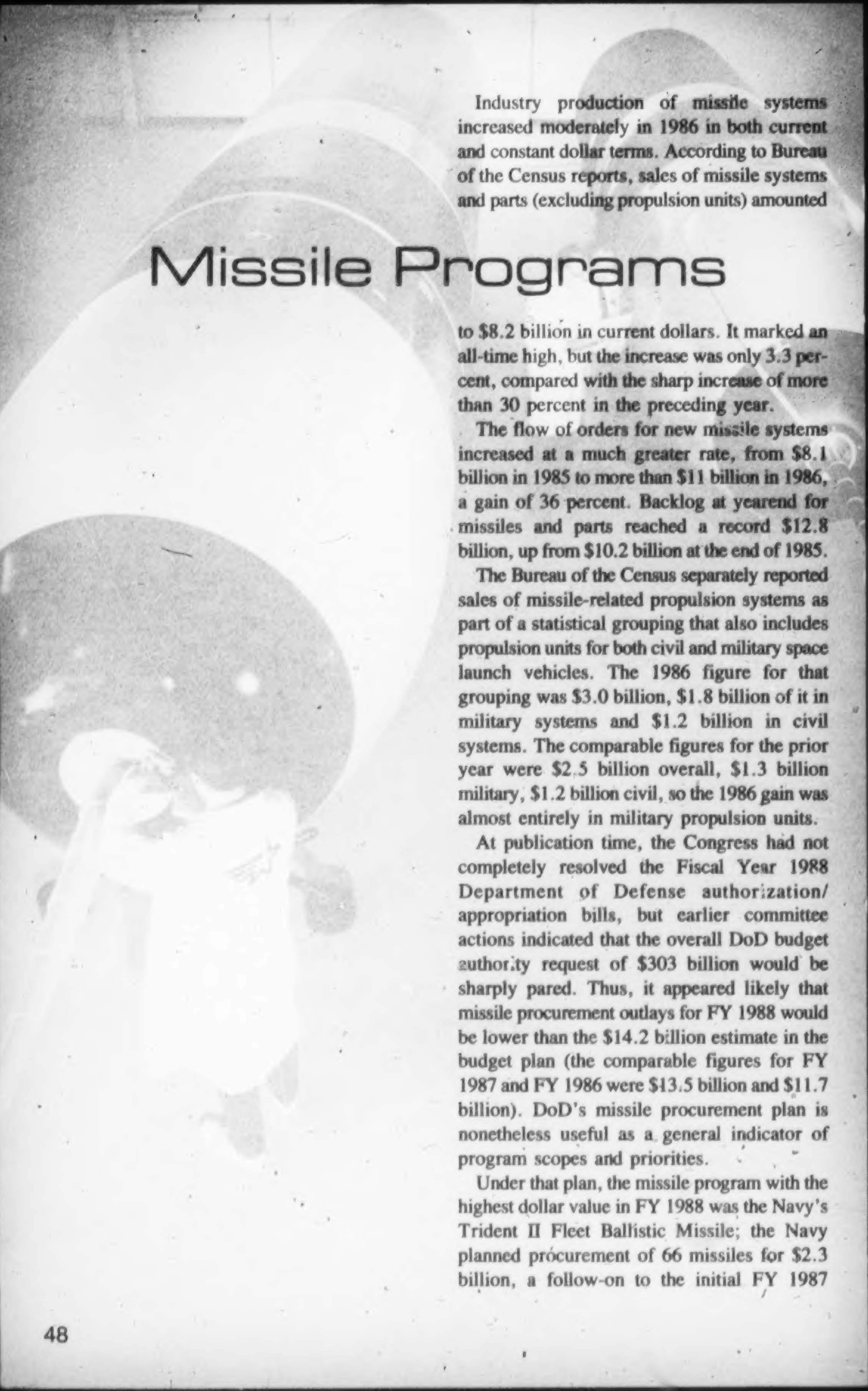
Tr. Qtr. Transition Quarter: Until June 30, 1976, the fiscal years ran from July 1 to June 30. Beginning October 1, 1976, the fiscal years run from October 1 through September 30. A three-month "Transition Quarter" from July 1 through September 30, 1976 belongs to neither fiscal year.

SPECIFICATIONS OF U.S. MILITARY AIRCRAFT ON ORDER OR IN PRODUCTION AS OF 1986

Primary Mission, DOD Designation, & Popular Name	Manufacturer	U.S. Military Service	Crew	Empty Weight (000's lbs)	Engines	Performance Typical for Primary Mission	Remarks
ATTACK							
A-6E Intruder	Grumman	USN/USMC	2	27	2 × P&W J52	Mach.8 sea level	Also EA-6A/B & KA–6D
A-6F	Grumman	USN/USMC	2	27	2 × GE F404-GE-400	Ordnance & missiles	Improved radar & avionics
A-7K Corsair 2	LTV Aero.	ANG	2	21	1 × All TF 41	Subsonic	Trainer; combat capable
AV-8B Harrier 2	MDC/Br.Aer.	USMC	1	13	1 × RR F402	Mach.9 +	Graphite/epoxy super-critical wing
A-10A Thunderbolt 2	Fairchild	USAF	1	22	2 × GE TF34	Max. speed 400kt.	Close air support
BOMBERS							
B-1B	Rockwell	USAF	4	182	4 × GE F101	High subsonic penetration	Intercont'l range, unrefueled
ELECTRONIC WARFARE							
EA-6A Intruder	Grumman	USN/USMC	2	28	2 × P&W J52	597n.m. standoff radius	Limited strike capability
EA-6B Prowler	Grumman	USN/USMC	4	33	2 × P&W J52	493n.m. standoff radius	Tactical jamming system
FIGHTERS							
F-5E Tiger 2	Northrop	USAF/USN	1	10	2 × GE J85	Mach 1.6 class	More than 1,200 F-5E/Fs delivered
F-5F Tiger 2	Northrop	USAF/USN	2	11	2 × GE J85	Mach 1.5 class	2-seat trainer/fighter
F-14A Tomcat	Grumman	USN	2	40	2 × P&W TF30	Mach 2.3 class	Missile, gun fleet defense
F-15C Eagle	MDC	USAF	1	29	2 × P&W F100	Mach 2.5 class	Air superiority, defense, guns, missiles; 15D = 2 seat trainer
F-16 Fighting Falcon	GD	USAF	1-2	15	1 × P&W F100	Mach 2 + class	Multirole fighter; fully fly-by-wire; missiles, guns
F/A-18 Hornet	MDC/Northrop	USN/USMC	1	24	2 × GE F404	Mach 1.8 +	Missiles, guns; also export
F-20 Tigershark	Northrop	Export	1	12	1 × GE F404	Mach 2 class	Multirole; adv. avionics
COMMAND/CONTROL AND PATROL							
RC-12D	Beech	Army	2	9	2 × PWC PT6-41	Max 294 kias	Modification of super king air 200
TR-1/U-2	Lockheed	USAF	1	18	1 × P&W J75	Altitudes 70,000 ft +	High alt. tactical recon.
P-3C Orion	Lockheed	USN	10	67	4 × All T56	14 + hr. mission duration	Torpedoes, missiles, sonobuoys, mines; also export
E-2C Hawkeye	Grumman	USN	5	38	2 × All T56	6 hr. mission duration	AEW command & control; passive detection
E-3A AWACS	Boeing	USAF/NATO	17	188	4 × P&W TF33	Long range, subsonic	Surveillance radar, command, control
CARGO-TRANSPORT							
C-2A Greyhound	Grumman	USN	2	34	2 × All T56	Cruise 260kt; 1,560n.m. range	First Navy multi-year procurement contract
C/KC-130 Hercules	Lockheed	USAF, USN, Export	4	74-78	4 × All T56	Cruise 385mph; 2,038n.m. range	92-128 troops or 39-43 thsnd. lbs.
C-5B Galaxy	Lockheed	USAF	6	363	4 × GE TF39	Cruise 563mph; 3,000n.m. range	Global strategic logistics; 208,000 lb. cargo capacity
C-9B Skytrain 2	MDC	USN	5-7	65	2 × P&W JT8D	Cruise 573mph; 3,300n.m. range	90 pass. or 34,444 lb. cargo
C-12 Huron	Beech	Army/USAF	2	8	2 × PWC PT6A	Cruise 259kt. at 14,000ft.	10-place; pass. or cargo
KC-10A Extender	MDC	USAF	5	241	3 × GE CF6	600 + mph.	Tanker or cargo
C-20A G3	Gulfstream	USAF	2	32	2 × RR Spey	Mach.77; 3,650 n.m.	VIP transport; 14 pass.
TRAINING							
T-34C Turbo Mentor	Beech	USN	2	3	1 × PWC PT6A	Cruise 211kt. at 17,500ft	Simulates jet a/c; weapons
T-45A	MDC/Br.Aer.	USN	2	9	1 × RR MK871	Cruise 609 mph at 8,000 ft.	Next generation trainer
HELICOPTERS							
AH-1T Sea Cobra	Bell-Textron	USN	2	9	2 × PWC T400	Max 218 mph; 360 mi.	TOW w/20 mm gun
AH-1S Cobra	Bell-Textron	Army	2	6	1 × Lyc T53	Max 195 mph; 380 mi.	TOW w/mini gun
AH-1W Super Cobra	Bell-Textron	USN	2	10	2 × GE T700	Max 218 mph	TOW, hellfire
AH-64 Apache	Hughes-MDC	Army	2	11	2 × GE T700	Max 197 mph; 445 mi.	Attack helicopter
CH-53E Super Stallion	Sikorsky-UTC	USN	3	33	3 × GE T64	Max 196 mph; 710 mi.	55 passengers, aux. tanks
SH-2F Seasprite	Kaman	USN	3	7	2 × GE T58	Max 165 mph; 400 mi.	LAMPS Mk.I helicopter
TH-57A Sea Ranger	Bell-Textron	USN	2	2	1 × All 250	Max 140 mph; 425 mi.	Primary trainer
SH-60B Seahawk	Sikorsky-UTC	USN	3	14	2 × GE T700	Max 171 mph	ASW
SH-60F Cv-Helo	Sikorsky-UTC	USN	4	14	2 × GE T700	Max 177 mph	Inner Zone ASW
UH-1H Iroquois	Bell-Textron	Army	2	5	1 × Lyc. T53	Max 127 mph; 286 mi.	Succeeds UH-1D
UH-60A Black Hawk	Sikorsky-UTC	Army/USAF	3	11	2 × GE T700	Max 196 mph; 370 mi.	UTTAS

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology Magazine."

CODE
Manufacturers: MDC = McDonnell Douglas; Br.Aer. = British Aerospace; GD = General Dynamics.
U.S. Military Service: USN = Navy; USMC = Marine Corps; USAF = Air Force; ANG = Air National Guard.
Engines: P&W = Pratt & Whitney; PWC = Pratt & Whitney of Canada; All = Detroit Diesel Allison Div. of General Motors; Lyc = Avco Lycoming; RR = Rolls Royce.



Missile Programs

Industry production of missile systems increased moderately in 1986 in both current and constant dollar terms. According to Bureau of the Census reports, sales of missile systems and parts (excluding propulsion units) amounted to $8.2 billion in current dollars. It marked an all-time high, but the increase was only 3.3 percent, compared with the sharp increase of more than 30 percent in the preceding year.

The flow of orders for new missile systems increased at a much greater rate, from $8.1 billion in 1985 to more than $11 billion in 1986, a gain of 36 percent. Backlog at yearend for missiles and parts reached a record $12.8 billion, up from $10.2 billion at the end of 1985.

The Bureau of the Census separately reported sales of missile-related propulsion systems as part of a statistical grouping that also includes propulsion units for both civil and military space launch vehicles. The 1986 figure for that grouping was $3.0 billion, $1.8 billion of it in military systems and $1.2 billion in civil systems. The comparable figures for the prior year were $2.5 billion overall, $1.3 billion military, $1.2 billion civil, so the 1986 gain was almost entirely in military propulsion units.

At publication time, the Congress had not completely resolved the Fiscal Year 1988 Department of Defense authorization/appropriation bills, but earlier committee actions indicated that the overall DoD budget authority request of $303 billion would be sharply pared. Thus, it appeared likely that missile procurement outlays for FY 1988 would be lower than the $14.2 billion estimate in the budget plan (the comparable figures for FY 1987 and FY 1986 were $13.5 billion and $11.7 billion). DoD's missile procurement plan is nonetheless useful as a general indicator of program scopes and priorities.

Under that plan, the missile program with the highest dollar value in FY 1988 was the Navy's Trident II Fleet Ballistic Missile; the Navy planned procurement of 66 missiles for $2.3 billion, a follow-on to the initial FY 1987 procurement of 21 weapons at $1.3 billion. The next largest procurement planned was the USAF's buy of 21 Peacekeeper ICBMs at $1.3 billion (following procurement of 12 in FY 1986 and FY 1987). Third among high-value procurements was the Army's Patriot long range air defense missile; the plan called for production of 715 additional missiles at a cost of $892 million.

Other major missiles in production during 1986/87 or planned for initial production in FY 1988 included:

Air Force. The AMRAAM (Advanced Medium Range Air-to-Air Missile), budgeted at $833 million for 630 units, including missiles for Navy use; the Infrared Imaging Maverick, an air-to- surface weapon employed by both the USAF and the Navy ($355 million); the Tomahawk Ground Launched Cruise Missile ($71 million); and the AGM-130 air-to-surface glide weapon ($44 million).

Army. The Multiple Launch Rocket System, a mobile rocket battery ($447 million); two versions of the Stinger short range antiaircraft weapon ($277 million); the Laser Hellfire helicopter-borne antiarmor missile, used by both the Army and the Navy ($168 million); the TOW 2 Army/Marine Corps antitank weapon ($158 million); and the Chaparral infrared homing surface-to-air missile ($34 million). The plan included $16.9 million for initial procurement of the Army Tactical Missile System.

Navy. The Tomahawk Cruise Missile, built in several versions for deployment from aircraft, surface ships, submarines and land platforms ($994 million); the HARM (High Speed AntiRadiation Missile), budgeted at $618 million for procurement of USAF as well as Navy missiles; the Standard ship defense surface-to-air missile ($583 million); the Phoenix long range air-to-air weapon ($398 million) the Harpoon air-launched antiship missile ($162 million); the Hawk surface-launched Marine Corps air defense system ($161 million); the Sparrow air-to-air weapon ($100 million, which includes Navy/Air Force procurements); the Sidewinder air-to-air missile, also a Navy/USAF weapon ($96 million); and the new Vertical Launched ASROC antisubmarine weapon ($58 million).

MISSILE PROGRAM PROCUREMENT[a]

Fiscal Years 1986, 1987 and 1988
(Millions of Dollars)

Agency, Type and Model	1986		1987[E]		1988[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
AGM-130	—	$ 14.3	40	$ 15.0	121	$ 43.8
ALCM	—	28.4	—	12.1	—	2.3
AMRAAM[b]	—	193.4	180	579.5	630	832.9
GLCM	95	461.1	76	116.9	37	70.8
IIR Maverick[b]	2,240	385.3	2,000	370.6	2,100	354.6
Peacekeeper (M-X)	12	1,048.4	12	1,082.9	21	1,259.9
Rapier	—	7.2	—	6.2	—	31.2
NAVY						
Harm[b]	2,141	$ 602.4	2,462	$ 611.9	2,514	$ 617.7
Harpoon	347	268.4	96	122.3	124	161.7
Hawk[e]	550	122.8	430	104.8	525	161.4
Laser Maverick[e]	1,500	151.6	1,800	160.2	1,099	111.8
Phoenix	265	315.1	205	285.6	430	398.0
RAM	—	—	—	38.7	240	45.0
Sidearm[g]	200	25.0	256	21.9	276	25.4
Sidewinder[b]	3,770	173.5	1,371	75.6	1,244	96.4
Sparrow[b]	2,445	391.7	2,065	323.7	558	99.5
Standard	1,271	759.4	1,194	689.0	1,150	583.1
Tomahawk	249	649.3	324	717.6	475	993.9
Trident I	—	25.9	—	4.6	—	7.0
Trident II	—	272.7	21	1,346.9	66	2,251.3
VLA	—	—	200	71.8	260	57.5
ARMY						
ATACMS	—	$ —	—	$ —	—	$ 16.9
Chaparral	—	122.4	—	28.5	122	34.2
Laser Hellfire[d]	6,000	212.3	—	—	5,000	168.4
MLRS	72,000	469.1	72,000	456.1	72,000	447.1
Patriot	560	874.8	700	962.3	715	891.5
Pershing II	—	212.8	—	30.6	—	6.7
PMS Stinger	—	—	20	36.5	39	55.8
Stinger[f]	2,909	229.4	4,865	292.7	4,625	220.8
TOW 2[c]	16,238	204.3	12,600	133.0	12,449	158.1

Source: "Program Acquisition Costs by Weapon System," and "Procurement Programs (p-1)" Department of Defense Budget (Annually).

NOTE See Research and Development Chapter for missile program RDT&E authorization data.

E Estimate. Latest year reflects Administration's budget proposal.

a Total Obligational Authority excluding initial spares.

b Navy and Air Force funding.

c Army and Marine Corps funding.

d Army and Navy funding.

e Marine Corps funding.

f Army, Marine Corps and Air Force funding.

g Navy and Marine Corps funding.

MAJOR MISSILES RESEARCH, DEVELOPMENT, PRODUCTION, OPERATION

Program	Agency	Status	Systems Contractor(s)	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-AIR					
AMRAAM	USAF/USN	D	Hughes	Hercules	Hughes
Falcon	USAF	O	Hughes	Morton Thiokol/ Hercules	Hughes
Phoenix-54A	USN	O	Hughes	Hercules	Hughes
Phoenix-54C	USN	P	Hughes	Hercules	Hughes
Sidewinder-9H	USN	O	NASC	Bermite/ Hercules	Ford Aero./ Raytheon
Sidewinder-9J	USAF	O	Ford Aerospace	Hercules/ Aerojet	Ford Aerospace
Sidewinder-9L	USN/USAF	O	NASC	Bermite/ Hercules	Raytheon/ Ford Aero.
Sidewinder-9M	USN/USAF	P	NASC	Morton Thiokol/ Hercules	Raytheon/ Ford Aero.
Sidewinder-9N	USAF	O	Ford Aero.	—	Ford Aero.
Sidewinder-9P	USAF	O	Ford Aero.	Hercules/ Aerojet	Ford Aero.
Sparrow-7E	USN/USAF	O	Raytheon	Hercules/ Aerojet	Raytheon
Sparrow-7F	USN/USAF	O	NASC	Hercules	Raytheon/GD
Sparrow-7M	USN/USAF	P	Raytheon/GD	Hercules	Raytheon/GD
AIR-TO-SURFACE					
ALCM	USAF	P	Boeing	Williams International	Honeywell/ Litton
HARM	USN/USAF	P	Texas Instr.	Morton Thiokol/ Hercules	Texas Instr.
Harpoon*	USN	P,O	McDonnell Douglas	Teledyne CAE	TI/IBM/LSI/ Northrop
GBU-15	USAF	P	Rockwell	Hughes	Hughes/ Rockwell
Maverick-65A/B	USAF	P,O	Hughes	MTI/Aerojet	Hughes
Maverick-65D	USAF	P,O	Hughes	MTI/Aerojet	Hughes
Maverick-65E	USMC	P	Hughes	MTI/Aerojet	Hughes
Maverick-65F	USN	D	Hughes	MTI/Aerojet	Hughes
Shrike	USN/USAF	O	NWC/PMTC	Aerojet/ Hercules	Texas Instruments
SRAM	USAF	O	Boeing	Lockheed	Singer
Standard ARM	USN/USAF	O	GD	NOSIH	GD
Walleye 1	USN	O	Martin Marietta	—	Martin Marietta/ Hughes
Walleye 1ER	USN	R,D	NAC	—	NAC
Walleye 2	USN	O	NAC	—	NAC
Walleye 2 (ER/DL)	USN	O	NAC	—	NAC

*Also Surface-to-Surface

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor(s)	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-SURFACE (Cont'd.)					
AGM-130A	USAF	D	Rockwell	Hercules	Rockwell
AGM-130B	USAF	D	Rockwell	Hercules	Rockwell
ANTI-SUBMARINE					
Subroc	USN	O	Goodyear Aerospace	Morton Thiokol	Singer
SURFACE-TO-AIR					
Chaparral	Army	O	Ford Aerospace	Hercules/Bermite	GE/Raytheon
Improved Chaparral	Army	P,O	Ford Aerospace	Bermite	Ford Aerospace
Hawk	Army	P,O	Raytheon	Aerojet	Raytheon
Patriot	Army	P	Raytheon	Morton Thiokol	Raytheon
RAM	USN	D	General Dynamics	Bermite/Hercules/MTI	General Dynamics
Redeye	Army/USMC	O	General Dynamics	Atlantic Research	General Dynamics
Roland	Army	O	Hughes/Boeing	Hercules	Hughes/Boeing
Sea Sparrow	USN	P,O	Raytheon/GD	Aerojet/Hercules	Raytheon/GD
Standard MR (SM-1)	USN	P,O	General Dynamics	Aerojet/NOSIH	General Dynamics
Standard MR (SM-2)	USN	P,O	General Dynamics	Aerojet/MTI	General Dynamics
Standard ER (SM-1)	USN	O	General Dynamics	Atlantic Research/NOSIH	General Dynamics
Standard ER (SM-2)	USN	P,O	General Dynamics	Atlantic Research/NOSIH/MTI	General Dynamics
Stinger	Army/USMC	P,O	General Dynamics	Atlantic Research	General Dynamics
Tartar	USN	O	GD	Aerojet	GD
Terrier	USN	O	General Dynamics	Atlantic Research/NOSIH	General Dynamics
SURFACE-TO-SURFACE					
Harpoon*	USN	P,O	McDonnell Douglas	Teledyne CAE	TI/IBM/LSI/Northrop
Minuteman 2	USAF	O	AFLC Hill AFB	MTI/Aerojet/Hercules/	Rockwell Autonetics
Minuteman 3	USAF	O	AFLC Hill AFB/	MTI/Aerojet	Rockwell Autonetics

*Also Air-to-Surface

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor(s)	Propulsion Manufacturer	Guidance Manufacturer
SURFACE-TO-SURFACE (Cont'd.)					
Peacekeeper (MX)	USAF	P,O	BMO/TRW	MTI/Avco/ Aerojet/ Hercules/ Rocketdyne/ GE	Rockwell/ Northrop/ Honeywell
Polaris A3	USN	O	Lockheed MSC	Aerojet/ Hercules	GE/Hughes/ MIT/Raytheon
Poseidon C3	USN	O	Lockheed MSC	MTI/ Hercules	GE/MIT/Hughes Raytheon
Tomahawk (SLCM)	USN	P	GD/MDC	Williams International	MDC/GD
Gryphon (GLCM)	USAF	P	GD/MDC	Williams International	MDC/GD
Titan 2	USAF	O	AFLC Hill AFB/ MM	Aerojet	GM/Delco Electronics
Trident C4	USN	P,O	Lockheed MSC	Hercules/ MTI	GE/Draper/ Raytheon/ Hughes
BATTLEFIELD SUPPORT AND ANTIARMOR					
Dragon	Army	P,O	MDC	MDC	MDC
Hellfire	Army/ USMC	P	Rockwell	Morton Thiokol	Martin Marietta
Lance	Army	O	Vought	RI Rocketdyne	E-Systems/ Sys-Donner/Arma
MLRS	Army	P,O	Vought	Atlantic Res.	—
Pershing 1A	Army	O	Martin Marietta	Morton Thiokol	Allied Bendix
Pershing 2	Army	P	Martin Mariétta	Hercules	Goodyear Aerospace
Shillelagh	Army	O	Ford Aerospace	Hercules	Ford Aerospace
TOW	Army	O	Hughes	Hercules	Emerson El.
ITOW	Army	P,O	Hughes	Hercules	Emerson El.
TOW2	Army	P,O	Hughes	Hercules/MTI	Emerson El.

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology Magazine."
Status: R—Research; D—Development; P—Production; O—Operational.

Abb: AFB - Air Force Base
AFLC - Air Force Logistics Cmd.
BMO - Ballistic Missile Office
GD - General Dynamics
GE - General Electric
LSI - Lear Siegler
MM - Martin Marietta
MDC - McDonnell Douglas
MIT - Massachusetts Institute of Technology
MTI - Morton Thiokol, Inc.
NAC - Naval Avionics Center
NASC - Naval Air Systems Command
NOSIH - Naval Ordnance Station, Indian Head
NWC - Naval Weapons Center
PMTC - Pacific Missile Test Center
RI - Rockwell International
TI - Texas Instruments
USAF - United States Air Force
USMC - United States Marine Corps
USN - United States Navy

DEPARTMENT OF DEFENSE OUTLAYS FOR MISSILE PROCUREMENT[a]

By Agency
Fiscal Years 1961-1988
(Millions of Dollars)

Year	TOTAL MISSILE PROCUREMENT[a]	Air Force	Navy[a]	Army
1961	$ 2,972	$1,922	$ 493	$ 557
1962	3,442	2,385	593	464
1963	3,817	2,676	718	423
1964	3,577	2,100	981	496
1965	2,096	1,320	522	254
1966	2,069	1,313	512	244
1967	1,930	1,278	432	220
1968	2,219	1,388	436	395
1969	2,509	1,382	534	593
1970	2,912	1,467	702	743
1971	3,140	1,497	791	852
1972	3,009	1,334	831	844
1973	3,023	1,454	628	941
1974	2,981	1,537	541	903
1975	2,889	1,602	615	672
1976	2,296	1,549	584	163
Tr. Qtr.	402	347	148	(93)
1977	2,781	1,501	905	374
1978	3,096	1,376	1,302	418
1979	3,786	1,537	1,702	547
1980	4,434	1,810	1,973	651
1981	5,809	2,366	2,297	1,146
1982	6,782	3,069	2,444	1,269
1983	7,795	3,383	2,812	1,600
1984	9,527	4,640	2,809	2,079
1985	10,749	5,409	2,941	2,399
1986	11,731	6,473	2,780	2,478
1987[E]	13,521	7,424	3,259	2,838
1988[E]	14,224	7,927	3,649	2,648

Source: Department of Defense Budget (Annually).

NOTE: Detail may not add to totals because of rounding.

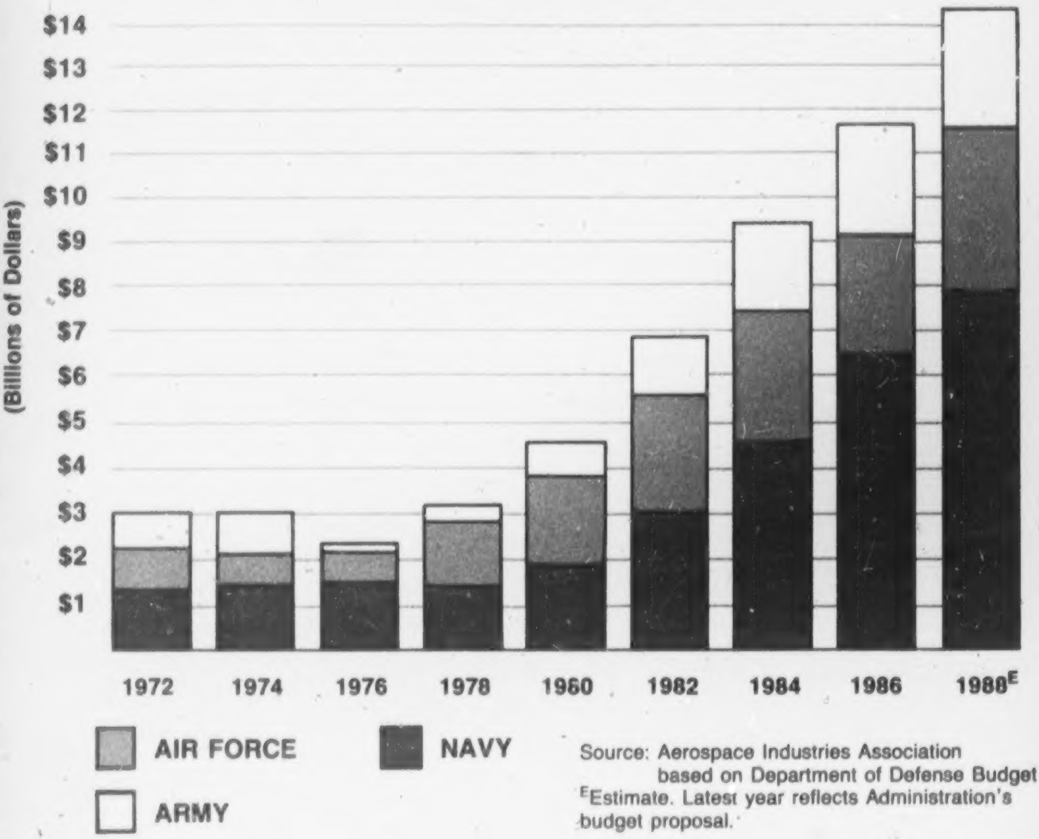
[a] Revised by AIA from previously published data to include Navy Weapons Procurement in Total Missile Procurement. Beginning 1978, DOD combined Navy Missile Procurement with torpedoes and other related products into Navy Weapons Procurement. Missiles comprise approximately 80 percent of the value of this category.

[E] Estimate. Latest year reflects Administration's budget proposal.

Tr. Qtr. Transition Quarter: Until June 30, 1976, the fiscal years ran from July 1 to June 30. Beginning October 1, 1976, the fiscal years run from October 1 through September 30. A three-month "Transition Quarter" from July 1 through September 30, 1976 belongs to neither fiscal year.

DEPARTMENT OF DEFENSE OUTLAYS FOR MISSILE PROCUREMENT

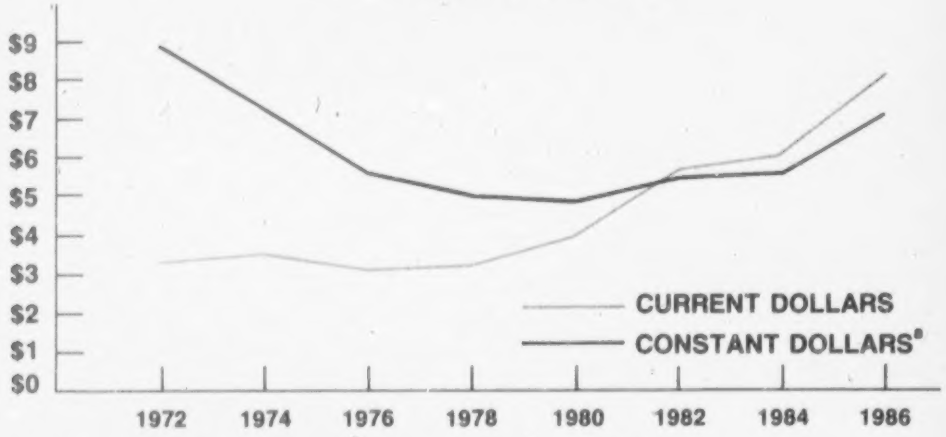
BY AGENCY FISCAL YEARS 1972-1988



Source: Aerospace Industries Association
based on Department of Defense Budget
ᴱEstimate. Latest year reflects Administration's budget proposal.

SALES OF MISSLE SYSTEMS & PARTS

CALENDAR YEARS 1972-1986



Source: Aerospace Industries Association based on Bureau of Census data.
ᵃBased on revised aerospace composite deflator (1982 = 100)

ORDERS, SALES, AND BACKLOG MISSILE SYSTEMS AND PARTS[a]

Calendar Years 1972-1986
(Millions of Dollars)

Year	SALES-Current Dollars	SALES-Constant Dollars[c]
1972	3,335	8,685
1973	3,391	7,904
1974	3,454	7,318
1975	3,548	6,694
1976	3,237	5,581
1977	3,118	5,021
1978	3,264[b]	4,991
1979	3,706	5,126
1980	3,971	4,945
1981	4,662	5,157[r]
1982	5,676	5,676
1983	5,991	5,711
1984	6,094	5,436[r]
1985	7,975	7,121[r]
1986	8,236	7,244

Year	NET NEW ORDERS	BACKLOG AS OF DECEMBER 31
1972	3,633	3,642
1973	3,617	3,868
1974	4,059	4,473
1975	3,655	4,580
1976	3,036	4,379
1977	3,280	4,541
1978	2,948	4,581
1979	3,724	4,916
1980	4,961	5,558
1981	6,030	6,749
1982	6,034	7,107
1983	7,231	8,406
1984	7,731	10,043
1985	8,122	10,190
1986	11,023	12,754

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] Prior to 1980, includes space vehicle systems and parts sold to other than U.S. Government customers.

[b] AIA estimate based on MQ37D.

[c] Based on revised aerospace composite price deflator (1982 = 100).

[r] Revised.

ORDERS, SALES, AND BACKLOG ENGINES AND PROPULSION UNITS FOR MISSILES AND SPACE VEHICLES[a]

Calendar Years 1972-1986
(Millions of Dollars)

Year	SALES-Current Dollars			SALES-Constant Dollars[c]		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1972	$ 607	$ 596	$ 11	$ 1,581	$ 1,552	$ 29
1973	627	607	20	1,462	1,415	47
1974	649	633	16	1,375	1,341	34
1975	643	626	17	1,213	1,181	32
1976	641	621	20	1,105	1,071	34
1977	787	757	30	1,267	1,219	48
1978	792	760	32	1,211	1,162	49
1979	952	915	37	1,317	1,266	51
1980	939	661	278	1,169	823	346
1981	1,204	786	418	1,332	869	462
1982	1,555	899	656	1,555	899	656
1983	1,814	951	863	1,729	907	823
1984[r]	2,305	1,116	1,189	2,056	996	1,060
1985[r]	2,466	1,256	1,210	2,202	1,121	1,081
1986	2,995	1,778	1,217	2,634	1,564	1,070

Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1972	$ 758	$ 742	$ 16	$ 671	$ 659	$ 12
1973	581	563	18	625	615	10
1974	702	680	22	678	662	16
1975	496	481	15	531	517	14
1976	783	763	20	673	659	14
1977	727	693	34	613	595	18
1978	967	919	48	788	754	34
1979	1,187	1,141	46	1,024	980	44
1980	1,121	653	568	1,284	871	413
1981	1,284	746	538	1,343	828	515
1982	2,112	1,134	978	1,901	1,063	838
1983	1,618	942	676	1,691	1,052	639
1984	3,770	2,258	1,512	3,156	2,194	962
1985[r]	3,823	1,323	2,500	4,513	2,261	2,252
1986	1,985	1,224	761	3,503	1,689	1,814

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] See table in Space Programs Chapter for Orders, Sales, and Backlog, Space Vehicle Systems.

[b] Prior to 1980 includes figures for nonmilitary U.S. Government customers.

[c] Based on revised aerospace composite price deflator (1982 = 100).

[r] Revised.

The rising trend in industry sales of space equipment continued in 1986 but at a somewhat slower pace, a gain of roughly eight percent in current dollar terms, compared with a more than 13 percent increase in the previous year.

Space Programs

Aerospace Industries Association data shows sales of space vehicles, systems and related equipment at $20.1 billion, up from $18.6 billion in the previous year.

As has been the case for several years, the increase was due entirely to the expanding military space program. Although no breakdown of sales is available on a calendar year basis, government data on overall outlays for federal space activities provides an indication of relative NASA/Department of Defense Expenditures. For Fiscal Year 1986, DoD outlays were estimated at $11.9 billion, compared with $6.7 billion for NASA. Estimates for FY 1987 were $14 billion for DoD, $6.8 billion for NASA.

Overall space activity funding in FY 1986 was estimated at $19.1 billion; the figure includes, in addition to NASA/DoD outlays, funding for space programs operated by the Department of Commerce ($505 million), the Department of Energy ($36.4 million), and other federal agencies ($16.7 million) for FY 1987, the overall estimate was $21.1 billion; Commerce funding dropped to $278 million, Energy funding more than doubled to $89 million.

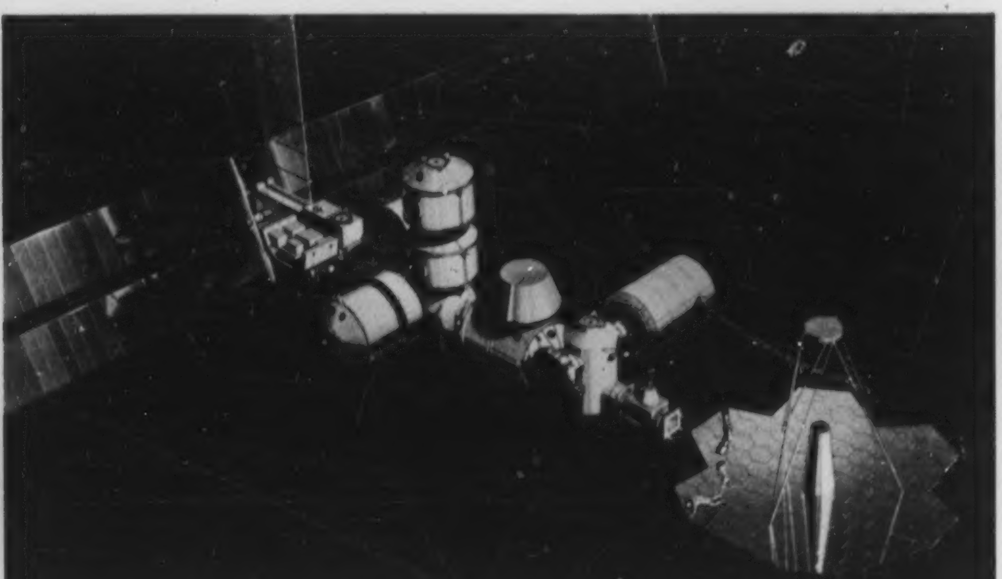
New orders for space systems dipped sharply in 1986, according to data supplied by the Bureau of the Census. The Bureau's figures, however, do not include propulsion systems, which in space vehicles represent a major element of cost; the data, therefore, serve only as a general trend indicator rather than as an expression of industry activity level. Net new orders for space systems in 1986 were $7.4 billion, compared with $8.4 billion in the previous year. Despite the decline, the backlog of orders increased to an all-time high of $8.1 billion at year-end 1986, up from $6.7 billion at the end of 1985.

NASA's post-accident recovery program progressed in 1987 with successful tests of the modified solid rocket booster joint and other modifications—including main engine changes—to the Shuttle Orbiter. The Space Shuttle was targeted for restart of flight operations in June 1988.

Also in 1987, NASA awarded a series of hardware development contracts for the U.S./International Space Station. Administration and Congressional pressure occasioned by mounting cost estimates forced a revision in the Space Station plan. The new program envisions an initial, limited capability Block I station to be assembled in orbit beginning in 1994, with first human occupancy in 1996. An enhanced capability version would be developed starting in 1992, assuming approval by a new Administration.

Aside from the Space Station, major NASA development programs active in 1986/87 included three of the "Great Observatories" series: Hubble Space Telescope, completed and targeted for Shuttle launch in November 1988; the Advanced X-ray Astrophysics Facility and the Gamma Ray Observatory, both planned for service in the 1990s. Among other programs are the Galileo Jupiter orbiter/probe, planned for Shuttle launch in 1988; the Magellan mission for radar mapping 90 percent of Venus' surface , also planned for 1989 launch; Ulysses, which will depart Earth around 1990 on a multiyear jaunt through interplanetary space and around the poles of the Sun; Atlas, first of a new series of investigations of solar radiation and the composition of the atmosphere; the Mars Observer, being developed for a detailed study of Mars with launch slated for 1992; TOPEX/Poseidon, an ocean topography measurement satellite, experimental forerunner of a future ocean observation system; and Astro, a Shuttleborne observatory to measure ultraviolet radiation from celestial sources, scheduled for 1991 launch.

The major space-related program of the Department of Defense is the Strategic Defense Initiative, a broad research and development effort designed to investigate the potential of a number of advanced technologies that might be applicable to a future system of ballistic missile defense. Among unclassified military space programs in development are the Navstar Global Positioning System, a network of 18 advanced navigation satellites to be operational in 1991, and the Milstar extra secure, highly survivable communications satellite system.



U.S. SPACECRAFT RECORD[a]

Calendar Years 1957-1986

Year	Earth Orbit[b]		Earth Escape[b]	
	Success	Failure	Success	Failure
1957	0	1	0	0
1958	5	8	0	4
1959	9	9	1	2
1960	16	12	1	2
1961	35	12	0	2
1962	55	12	4	1
1963	62	11	0	0
1964	69	8	4	0
1965	93	7	4	1
1966	94	12	7	1[c]
1967	78	4	10	0
1968	61	15	3	0
1969	58	1	8	1
1970	36	1	3	0
1971	45	2	8	1
1972	33	2	8	0
1973	23	2	3	0
1974	27	2	1	0
1975	30	4	4	0
1976	33	0	1	0
1977	27	2	2	0
1978	34	2	7	0
1979	18	0	0	0
1980	16	4	0	0
1981	20	1	0	0
1982	21	0	0	0
1983	31	0	0	0
1984	35	3	0	0
1985	37	1	0	0
1986	11	4	0	0
TOTAL	1,112	142	79	15

Source: NASA, "Aeronautics and Space Report of the President," (Annually).

[a] Payloads, rather than launchings; some launches account for multiple spacecraft. Includes spacecraft from cooperating countries launched by U.S. launch vehicles.

[b] The criterion of success or failure used is attainment of earth orbit or earth escape rather than judgment of mission success. "Escape" flights include all that were intended to go at least an altitude equal to lunar distance from the earth.

[c] This earth-escape failure did attain earth orbit and therefore is included in the earth-orbit success totals.

WORLDWIDE SPACE LAUNCHINGS WHICH ATTAINED EARTH ORBIT OR BEYOND[a]

Calendar Years 1957-1986

Country	Total 1957-1986	1982	1983	1984	1985	1986
TOTAL	2,866	121	127	129	121	103
U.S.S.R.	1,922	101	98	97	98	91
United States	859	18	22	22	17	6
Japan	31	1	3	3	2	2
People's Republic of China	17	1	1	3	1	2
European Space Agency	14	—	2	4	3	2
India	3	—	1	—	—	—
Other[b]	20[b]	—	—	—	—	—

Source: National Aeronautics and Space Administration, "Aeronautics and Space Report of the President," (Annually).

[a] Number of launchings rather than spacecraft; some launches orbited multiple spacecraft.

[b] Includes 10 by France, 8 by Italy (5 were U.S. spacecraft), 1 by Australia, and 1 by the United Kingdom.

SUCCESSFUL U.S. LAUNCHES

Calendar Year 1986

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
Jan. 12 Columbia (STS-61C) Satcom K-1 Space Shuttle	SPACE TRANSPORTATION SYSTEM: Twenty-fourth operational flight. Successfully deployed RCA Satcom K-1 satellite. Also conducted the following experiments: Materials Science Laboratory-2 (MLS-2), Hitchhiker G-1, Particle Analysis Cameras for the Shuttle (PACS), Capillary Pump Loop (CPI), Shuttle Environment Effects on Coated Mirrors (SEECM); 12 experiments flown on Get Away Special Bridge Assembly, 1 additional GAS experiment, Infrared Imaging Experiment (IR-IE). Middeck payloads: Initial Blood Storage Experiment (IBSE), and Comet Halley Active Monitoring Program (CHAMP). Additionally 3 Shuttle Student Involvement Program (SSIP) experiments.
Feb. 9 Defense Atlas H	DOD: To develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Sep. 5 Defense Delta 180	DOD: Successful launch by NASA for DoD, Strategic Defense Initiative (SDI). Space intercept and collision test. Spacecraft destroyed.
Sep. 17 NOAA 10 Atlas E	WEATHER OBSERVATION SATELLITE: Third of the advanced Tiros-N series. Funded by NOAA and successfully launched by NASA. Also onboard search and rescue instruments.
Nov. 14 Polar Bear Scout	DOD SATELLITE: Successfully launched by NASA for the U.S. Air Force. Reconditioned satellite which hung for several years in the National Air and Space Museum. Experiments to study radio interference caused by aurora borealis, or nothern lights. Operating and returning data.
Dec. 5 Fltsatcom 7 Atlas-Centaur	DOD SATELLITE: Communications satellite launched by NASA for the Navy, to serve DoD. Still in orbit.

U.S. SPACE LAUNCH VEHICLES

As of 1986

Vehicle and Initial Launch & First Launch of this Modification	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Geo-synch.-Transfer Orbit	Circular Sun-Synch. Orbit
Scout (1960; 1979)	1. Algol IIIA* 2. Castor IIA* 3. Antares IIIA* 4. Altair IIIA*	431.1 285.2 83.1 25.6	255 205[b]	—	155[b]
Delta 2900 Series (Thor-Delta) (1960; 1973)	1. Thor plus 9 TX 354-5* 2. Delta 3. TE 364-4*	912.0 147[c] 44.2 65.8	2,000 1,410[b]	705	1,250[b]
Delta 3900 Series (Thor-Delta)[d] (1960; 1982)	1. Thor plus 9 TX 526-2* 2. Delta	912.0 375[c] 44.2	3,045 2,180[b]	1,275	2,135[b]
Atlas E (1967; 1972)	1. Atlas booster & sustainer	1,722.0	2,090[b,e]	—	1,500[b]
Atlas-Centaur (1962; 1984)	1. Atlas booster & sustainer 2. Centaur	1,913.0 146.0	6,100	2,360[f]	—

Vehicle and Launch Date	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Direct Geo-synch Orbit	Sun-Synch. Transfer Orbit
Titan IIIB-Agena (1966)	1. LR-87 2. LR-91 3. Agena	2,341.0 455.1 71.2	3,600[b]	—	3,060[b]

(Continued on next page)

U.S. SPACE LAUNCH VEHICLES

As of 1986 (Continued)

Vehicle and Launch Date	Stages	Thrust (Kilonewtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Direct Geo.-Synch. Orbit	Sun Synch. Transfer Orbit
Titan IV/IUS (1983)	1. Two 5½-segment 3.05-m. dia* 2. LR-87 3. LR-91 4. IUS 1st stage* 5. IUS 2nd stage*	11,564.8 2,366.3 449.3 275.8 115.7	14,920	1,850[b]	—
Titan IV/ Transtage (1984)	1. Two 5½-segment 3.05-m. dia* 2. LR-87 3. LR-91 4. Transtage	11,564.8 2,366.3 449.3 69.8	14,920	1,850[b]	—
Space Shuttle (reusable) (1981)	1. Orbiter; 3 main engines (SSMEs) fire in parallel with SRBs 2. Two solid-fueled rocket boosters (SRBs) mounted on external tank (ET) fire in parallel with SSMEs	1,670[c] 11,790[c]	29,500 in full performance configuration (280-420 km orbit)		

Source: NASA, "Aeronautics and Space Report of the President" (Annually) and NASA Historian's office.

* Solid propellant; all others are liquid.

[a] Due east launch except as indicated.

[b] Polar launch.

[c] Each.

[d] Maximum performance based on 3920 and 3920/PAM (payload assist module) configurations.

[e] With dual TE 364-4.

[f] 96° flight azimuth.

U.S. MANNED SPACE FLIGHT LOG

Calendar Year 1986

Launch Date	Spacecraft and Crew	Flight Time (days:hrs:min)	Highlights
Jan. 12	Space Shuttle Columbia (STS-61C) Crew: Robert L. Gibson Charles F. Bolden, Jr. Franklin Chang-Diaz Steven A. Hawley George D. Nelson Roger Cenker Cong. Bill Nelson	6:2:4	Twenty-fourth STS flight. Launched one communications sattellite. First member of U.S. House of Representatives in space.

Souce: Nasa Historians Office

ORDERS, SALES, AND BACKLOG SPACE VEHICLE SYSTEMS

(Excluding Engines and Propulsion Units)[a]
Calendar Years 1972-1986
(Millions of Dollars)

Year	SALES-Current Dollars			SALES-Constant Dollars[c]		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1972	$1,656	$ 905	$ 751	$4,313	$2,357	$1,956
1973	1,562	902	660	3,641	2,103	1,538
1974	1,751	944	807	3,710	2,000	1,710
1975	2,119	1,096	1,023	3,998	2,068	1,930
1976	2,002	904	1,098	3,452	1,559	1,893
1977	1,870	814	1,056	3,011	1,311	1,700
1978	2,324	1,006	1,318	3,554	1,538	2,015
1979	2,539	1,105	1,434	3,512	1,528	1,983
1980	3,483	1,461	2,022	4,337	1,819	2,518
1981	3,856	1,736	2,120	4,265	1,920	2,345
1982	4,749	2,606	2,143	4,749	2,606	2,143
1983	4,940	2,420	2,520	4,709	2,307	2,402
1984	5,225	3,019	2,206	4,661	2,693	1,968
1985[r]	6,300	4,241	2,059	5,625	3,787	1,838
1986	6,304	4,579	1,725	5,544	4,027	1,517

Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1972	$1,699	$ 948	$ 751	$ 959	$ 646	$ 313
1973	1,780	1,179	601	1,177	923	254
1974	2,066	1,152	914	1,492	1,131	361
1975	1,931	984	947	1,304	1,019	285
1976	1,932	787	1,145	1,234	902	332
1977	2,225	1,175	1,050	1,589	1,263	326
1978	3,157	1,436	1,721[d]	2,188	1,693	495
1979	2,698	1,018	1,680	1,448	909	539
1980	3,636	1,625	2,011	2,099	1,218	881
1981	5,062	2,878	2,184	3,163	2,166	997
1982	5,842	2,718	3,124	4,254	2,277	1,977
1983	5,399	3,016	2,383	4,865	2,733	2,132
1984	4,984	3,385	1,599	4,624	3,099	1,525
1985[r]	8,383	6,083	2,300	6,707	4,941	1,766
1986	7,437	5,666	1,771	8,063	6,028	2,035

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] See table in Missile Program Chapter for Orders, Sales, and Backlog, Engine and Propulsion Units for Missiles and Space Vehicles.

[b] Space vehicle systems and parts sold to other than U.S. Government customers included as of 1980; previously, this product group combined with missile systems and parts.

[c] Based on revised aerospace composite price deflator (1982 = 100); detail may not add to totals because of rounding.

[d] AIA estimate based on MQ37D data.

[r] Revised.

FEDERAL SPACE ACTIVITIES OUTLAYS

Fiscal Years 1961-1987
(Millions of Current Dollars)

Year	TOTAL	NASA[a]	DOD	Energy	Commerce	Other[b]
1961	$ 1,467.9	$ 693.6	$ 710.0	$ 64.3	$ —	$ —
1962	2,386.6	1,225.9	1,028.8	130.0	1.0	0.9
1963	4,078.6	2,516.8	1,367.5	181.0	12.2	1.1
1964	5,929.8	4,131.3	1,563.5	220.1	12.3	2.6
1965	6,886.1	5,035.0	1,591.8	232.2	24.1	3.0
1966	7,718.5	5,857.9	1,637.4	188.3	28.1	6.8
1967	7,237.3	5,336.7	1,673.1	183.6	38.6	5.3
1968	6,666.7	4,595.3	1,890.2	146.5	29.0	5.7
1969	6,326.1	4,078.0	2,095.0	117.5	31.0	4.6
1970	5,453.2	3,565.2	1,756.1	102.6	24.0	5.3
1971	4,999.0	3,171.0	1,693.0	97.3	29.8	7.9
1972	4,771.8	3,194.9	1,470.0	59.6	37.4	9.9
1973	4,719.4	3,069.4	1,557.0	51.1	29.4	12.5
1974	4,853.9	2,960.4	1,777.0	38.8	64.0	13.7
1975	4,890.8	2,950.9	1,831.1	34.3	63.6	10.9
1976	5,313.9	3,336.3	1,864.4	25.7	71.1	16.4
Tr. Qtr.	1,361.0	868.6	458.1	7.5	23.2	3.6
1977	5,559.1	3,599.5	1,832.7	22.2	86.9	17.8
1978	6,188.2	3,582.4	2,457.0	28.6	100.7	19.5
1979	6,808.3	3,743.9	2,891.8	54.7	97.4	20.5
1980	7,667.7	4,340.1	3,162.3	48.8	88.7	27.8
1981	9,165.5	4,877.1	4,130.5	46.9	81.0	30.0
1982	10,466.2	5,463.3	4,771.5	59.5	142.4	29.5
1983	12,590.4	6,100.9	6,246.7	39.6	178.0	25.2
1984	14,726.1	6,461.4	8,000.2	33.4	208.7	22.4
1985	17,254.8	6,607.4	10,441.3	34.0	155.4	16.7
1986[E]	19,140.8	6,732.0	11,850.4	36.4	505.3	16.7
1987[E]	21,184.2	6,826.2	13,973.4	89.1	278.2	17.3

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] Excludes amounts for air transportation.

[b] Departments of Interior and Agriculture, and The National Science Foundation. NSF funding transferred to NASA after 1982.

[E] Estimate. Latest year reflects Administration's budget proposal.

FEDERAL SPACE ACTIVITIES OUTLAYS IN CONSTANT DOLLARS

Fiscal Years 1961-1987
(Millions of Constant Dollars, 1982 = 100[a])

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1961	$ 4,668.9	$ 2,206.1	$2,258.3	$204.5	$ —	$ —
1962	7,458.1	3,830.9	3,215.0	406.3	3.1	2.8
1963	12,518.7	7,725.0	4,197.4	555.6	37.4	3.4
1964	17,941.9	12,500.2	4,730.7	666.0	37.2	7.9
1965	20,397.2	14,914.1	4,715.0	687.8	71.4	8.9
1966	22,217.9	16,862.1	4,713.3	542.0	80.9	19.6
1967	20,142.8	14,853.0	4,656.6	511.0	107.4	14.8
1968	17,926.1	12,356.3	5,082.5	393.9	78.0	15.3
1969	16,138.0	10,403.1	5,344.4	299.7	79.1	11.7
1970	13,146.6	8,595.0	4,233.6	247.3	57.9	12.8
1971	11,449.8	7,262.9	3,877.7	222.9	68.3	18.1
1972	10,360.0	6,936.4	3,191.5	129.4	81.2	21.5
1973	9,760.9	6,348.3	3,220.3	105.7	60.8	25.9
1974	9,305.8	5,675.6	3,406.8	74.4	122.7	26.3
1975	8,502.8	5,130.2	3,183.4	59.6	110.6	18.9
1976	8,559.8	5,374.2	3,003.2	41.4	114.5	26.4
Tr. Qtr.	2,108.3	1,345.5	709.6	11.6	35.9	5.6
1977	8,293.5	5,370.0	2,734.1	33.1	129.6	26.6
1978	8,628.3	4,995.0	3,425.8	39.9	140.4	27.2
1979	8,739.8	4,806.0	3,712.2	70.2	125.0	26.3
1980	9,048.5	5,121.7	3,731.8	57.6	104.7	32.8
1981	9,832.1	5,231.8	4,430.9	50.3	86.9	32.2
1982	10,466.2	5,463.3	4,771.5	59.5	142.4	29.5
1983	12,077.1	5,852.2	5,992.0	38.0	170.7	24.2
1984	13,587.5	5,961.8	7,381.6	30.8	192.6	20.7
1985	15,404.7	5,898.9	9,321.8	33.4	138.7	14.9
1986[E]	16,602.3	5,839.2	10,278.8	31.6	438.3	14.5
1987[E]	17,819.8	5,742.1	11,754.2	74.9	234.0	14.6

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Based on fiscal year GNP implicit price deflator.
b Excludes amounts for air transportation.
c Departments of Interior and Agriculture, and The National Science Foundation. NSF funding transferred to NASA after 1982.
E Estimate. Latest year reflects Administration's budget proposal.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY

Fiscal Years 1961-1987[a]
(Millions of Current Dollars)

Year	TOTAL	NASA[a]	DOD	Energy	Commerce	Other[b]
1961	$ 1,808	$ 926	$ 814	$ 68	$ —	$ 1
1962	3,295	1,797	1,298	148	51	1
1963	5,435	3,626	1,550	214	43	2
1964	6,831	5,016	1,599	210	3	3
1965	6,956	5,138	1,574	229	12	3
1966	6,970	5,065	1,689	187	27	3
1967	6,710	4,830	1,664	184	29	3
1968	6,529	4,430	1,922	145	28	4
1969	5,976	3,822	2,013	118	20	3
1970	5,341	3,547	1,678	103	8	4
1971	4,741	3,101	1,512	95	27	5
1972	4,575	3,071	1,407	55	31	10
1973	4,825	3,093	1,623	54	40	15
1974	4,640	2,759	1,766	42	60	14
1975	4,914	2,915	1,892	30	64	13
1976	5,320	3,225	1,983	23	72	16
Tr. Qtr.	1,341	849	460	5	22	4
1977	5,983	3,440	2,412	22	91	18
1978	6,518	3,623	2,738	34	103	20
1979	7,244	4,030	3,036	59	98	21
1980	8,689	4,680	3,848	40	93	28
1981	9,978	4,992	4,828	41	87	30
1982	12,441	5,528	6,679	61	145	29
1983	15,589	6,328	9,019	39	178	25
1984	17,136	6,648	10,195	34	236	22
1985	20,167	6,925	12,768	34	423	17
1986[E]	21,201	6,701	14,126	36	321	17
1987[E]	23,630	6,988	16,287	89	249	17

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
Note: Detail may not add to totals because of rounding.
[a] Excludes amounts for air transportation.
[b] Departments of Interior and Agriculture, and the National Science Foundation. NSF funding transferred to NASA after 1982.
[E] Estimate. Latest year reflects Administration's budget proposal.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY IN CONSTANT DOLLARS

Fiscal Years 1961-1987

(Millions of Constant Dollars, 1982 = 100[a])

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1961	$ 5,751	$ 2,945	$ 2,589	$216	$ —	$ 3
1962	10,297	5,616	4,056	463	159	3
1963	16,682	11,130	4,758	657	132	6
1964	20,669	15,177	4,838	635	9	9
1965	20,604	15,219	4,662	678	36	9
1966	20,063	14,580	4,862	538	78	9
1967	18,675	13,443	4,631	512	81	8
1968	17,556	11,912	5,168	390	75	11
1969	15,245	9,750	5,135	301	51	8
1970	12,876	8,551	4,045	248	19	7
1971	10,859	7,103	3,463	218	62	11
1972	9,933	6,667	3,055	119	67	22
1973	9,979	6,397	3,357	112	83	31
1974	8,896	5,289	3,386	81	115	27
1975	8,543	5,068	3,289	52	111	23
1976	8,570	5,195	3,194	37	116	26
Tr. Qtr.	2,077	1,315	713	8	34	6
1977	8,926	5,132	3,598	33	136	27
1978	9,088	5,052	3,818	47	144	28
1979	9,299	5,173	3,897	76	126	27
1980	10,254	5,523	4,541	47	110	33
1981	10,704	5,355	5,179	44	93	32
1982	12,441	5,528	6,679	61	145	29
1983	14,953	6,070	8,651	37	171	24
1984	15,811	6,134	9,407	31	218	20
1985	18,005	6,182	11,399	30	378	15
1986[E]	18,389	5,812	12,253	31	278	15
1987[E]	19,877	5,878	13,700	75	209	14

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President," (Annually).

a Based on fiscal year GNP implicit price deflator.

b Excludes amounts for air transportation.

c Departments of Interior and Agriculture, and The National Science Foundation. NSF funding transferred to NASA after 1982.

E Estimate. Latest year reflects Administration's budget proposal.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY

Fiscal Years 1961-1988
(Millions of Current Dollars)

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1961	$ 964	$ 672	$125	$ 167
1962	1,825	1,285	326	214
1963	3,673	2,929	744	*(a)*
1964	5,099	3,890	713	496
1965	5,250	4,360	267	623
1966	5,175	4,502	61	602
1967	4,968	4,235	85	648
1968	4,589	3,912	38	639
1969	3,995	3,314	33	648
1970	3,749	2,993	53	703
1971	3,312	2,556	26	730
1972	3,308	2,523	53	732
1973	3,408	2,599	79	730
1974	3,040	2,194	101	745
1975	3,231	2,323	143	765
1976	3,552	2,678	82	792
Tr. Qtr.	932	700	11	221
1977	3,819	2,856	118	845
1978	4,064	3,012	162	890
1979	4,559	3,477	148	934
1980	5,243	4,088	159	996
1981	5,522	4,334	117	1,071
1982	6,020	4,772	114	1,134
1983	6,875	5,539	139	1,197

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984	$7,316	$2,064	$3,772	$223	$1,256
1985	7,573	2,468	3,594	178	1,332
1986	7,807	2,619	3,670	176	1,342
1987^{E}	10,508	3,070	5,805	166	1,466
1988^{E}	9,481	3,623	4,064	196	1,598

Source: "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Included in Research and Development for one year.
E Estimate. Latest year reflects Administration's budget proposal.
Tr. Qtr. Transition Quarter: Until June 30, 1976, the fiscal years ran from July 1 to June 30. Beginning October 1, 1976, the fiscal years run from October 1 through September 30. A three-month "Transition Quarter" from July 1 through September 30, 1976 belongs to neither fiscal year.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY IN CONSTANT DOLLARS

Fiscal Years 1961-1988
(Millions of Constant Dollars 1982 = 100[a])

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1961	$ 3,066	$ 2,137	$ 398	$ 531
1962	5,703	4,016	1,019	669
1963	11,274	8,990	2,284	*(b)*
1964	15,428	11,770	2,157	1,501
1965	15,551	12,915	791	1,845
1966	14,896	12,959	176	1,733
1967	13,827	11,787	237	1,804
1968	12,339	10,519	102	1,718
1969	10,191	8,454	84	1,653
1970	9,038	7,216	128	1,695
1971	7,586	5,854	60	1,672
1972	7,182	5,478	115	1,589
1973	7,049	5,375	163	1,510
1974	5,828	4,206	194	1,428
1975	5,617	4,039	249	1,330
1976	5,722	4,314	132	1,276
Tr. Qtr.	1,444	1,084	17	342
1977	5,697	4,261	176	1,261
1978	5,666	4,200	226	1,241
1979	5,852	4,463	190	1,199
1980	6,187	4,824	188	1,175
1981	5,924	4,649	126	1,149
1982	6,020	4,772	114	1,134
1983	6,595	5,313	133	1,148

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984	$6,750	$ 1,904	$ 3,480	$ 206	$1,159
1985[r]	6,761	2,203	3,209	159	1,189
1986	6,772	2,272	3,183	153	1,164
1987[E]	8,839	2,582	4,883	140	1,233
1988[E]	7,703	2,944	3,302	159	1,298

Source: AIA, derived from "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding
a Based on fiscal year GNP implicit price deflator.
b Included in Research and Development for one year.
E Estimate. Latest year reflects Administration's budget proposal.
r Revised
Tr. Qtr. Transition Quarter: Until June 30, 1976, the fiscal years ran from July 1 to June 30. Beginning October 1, 1976, the fiscal years run from October 1 through September 30. A three-month "Transition Quarter" from July 1 through September 30, 1976 belongs to neither fiscal year.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS

Fiscal Years 1961-1988
(Millions of Current Dollars)

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1961	$ 744	$ 487	$ 98	$ 159
1962	1,257	936	114	207
1963	2,552	1,912	225	416
1964	4,171	3,317	438	416
1965	5,093	3,984	531	578
1966	5,933	4,741	573	619
1967	5,426	4,487	289	650
1968	4,724	3,946	126	652
1969	4,251	3,530	65	656
1970	3,753	2,992	54	707
1971	3,382	2,630	44	708
1972	3,422	2,623	50	749
1973	3,315	2,541	45	729
1974	3,256	2,421	75	760
1975	3,266	2,420	85	761
1976	3,669	2,749	121	799
Tr. Qtr.	952	731	26	195
1977	3,945	2,980	105	860
1978	3,983	2,989	124	870
1979	4,196	3,139	133	925
1980	4,852	3,702	140	1,010
1981	5,426	4,228	147	1,050
1982	6,035	4,796	109	1,130
1983	6,664	5,316	108	1,240

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984	$7,048	$2,792	$2,915	$109	$1,232
1985	7,251	2,118	3,707	170	1,322
1986	7,403	2,615	3,267	189	1,332
1987^E	7,875	2,825	3,449	129	1,474
1988^E	9,534	3,268	4,529	152	1,585

Source: "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
E Estimate. Latest year reflects Administration's budget proposal.
Tr. Qtr. Transition Quarter: Until June 30, 1976, the fiscal years ran from July 1 to June 30. Beginning October 1, 1976, the fiscal years run from October 1 through September 30. A three-month "Transition Quarter" from July 1 through September 30, 1976 belongs to neither fiscal year.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS IN CONSTANT DOLLARS

Fiscal Years 1961-1988
(Millions of Constant Dollars, 1982 = 100[a])

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1961	$ 2,366	$ 1,549	$ 312	$ 506
1962	3,928	2,925	356	647
1963	7,833	5,869	691	1,277
1964	12,620	10,036	1,325	1,259
1965	15,086	11,801	1,573	1,712
1966	17,078	13,647	1,649	1,782
1967	15,102	12,488	804	1,809
1968	12,702	10,610	339	1,753
1969	10,844	9,005	166	1,673
1970	9,048	7,213	130	1,704
1971	7,746	6,024	101	1,622
1972	7,429	5,695	109	1,626
1973	6,856	5,255	93	1,508
1974	6,242	4,641	144	1,457
1975	5,678	4,207	148	1,323
1976	5,910	4,428	195	1,287
TR. QTR.	1,474	1,132	40	302
1977	5,885	4,446	157	1,283
1978	5,553	4,168	173	1,213
1979	5,386	4,030	171	1,187
1980	5,726	4,369	165	1,192
1981	5,821	4,536	158	1,126
1982	6,035	4,796	109	1,130
1983	6,392	5,099	104	1,189

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984	$6,503	$2,576	$2,690	$ 101	$1,137
1985[r]	6,474	1,891	3,310	152	1,180
1986	6,421	2,268	2,834	164	1,155
1987[E]	6,624	2,376	2,901	109	1,240
1988[E]	7,746	2,655	3,680	123	1,288

Source: AIA, derived from "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
[a] Based on fiscal year GNP implicit price deflator.
[E] Estimate. Latest year reflects Administration's budget proposal.
[r] Revised.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY FOR RESEARCH AND DEVELOPMENT AND SPACE FLIGHT, CONTROL & DATA COMMUNICATIONS[a]

Fiscal Years 1986-1988
(Millions of Dollars)

	1986	1987[E]	1988[E]
RESEARCH AND DEVELOPMENT—TOTAL	$2,619	$3,102	$3,623
Space Station—Total	$ 200	$ 420	$ 767
Space Transportation Capability Development—Total	404	496	569
Space Science & Applications—Total	1,477	1,527	1,508
Physics and Astronomy	569	552	567
Planetary Exploration	354	358	307
Life Sciences	66	72	75
Space Applications	488	544	559
Technology Utilization—Total	11	16	18
Commercial Use of Space—Total	16	26	36
Aeronautics & Space Technology—Total	489	592	691
Aeronautical Research & Technology	337	376	375
Transatmospheric Research & Technology	—	45	66
Space Research & Technology	151	171	250
Safety, Reliability and Quality Assurance—Total	8	9	16
Tracking and Data Advanced Systems—Total	16	17	18
SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS—TOTAL	$3,666	$5,815	$4,064
Space Shuttle Production & Operational Capability—Total	$1,365	$1,005	$1,230
Orbiter	396	373	403
Launch & Mission Support	180	148	249
Propulsion Systems	789	464	552
Changes & Systems Upgrading	—	20	25
Replacement Orbiter—Total	—	2,100	—
Space Transportation Operations—Total	1,640	1,847	1,886
Flight Operations	434	617	561
Flight Hardware	891	839	923
Launch & Landing Operations	315	391	402
Space and Ground Networks, Communications & Data Systems—Total	660	863	949

Source: "NASA Budget Briefing Background Material" (Annually).
NOTE: Detail may not add to totals because of rounding.
[a] Amounts shown reflect the termination of the Advanced Communications Technology Satellite.
[E] Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE SPACE PROGRAMS[a] PROCUREMENT (INCLUDING INITIAL SPARES) AND RDT&E

Fiscal Years 1986, 1987 and 1988
(Millions of Dollars)

Agency and Program	1986		1987^E		1988^E	
	Procurement	RDT&E	Procurement	RDT&E	Procurement	RDT&E
AIR FORCE						
Air Force Satellite Communications System (Afsatcom)	$ 30.8	$ —	$ —	$ —	$ —	$ —
Defense Meteorological Satellite Program (DMSP)	38.7	NA	18.9	61.2	97.4	56.2
Defense Satellite Communications System (DSCS)	129.1	NA	110.5	13.1	75.9	—
Medium Launch Vehicle	—	—	227.0	—	197.9	—
Navstar Global Positioning System	203.4	NA	128.5	36.3	92.6	26.3
Space Boosters	348.5	NA	442.3	274.4	474.4	246.6
Space Defense System	—	—	—	189.3	21.8	402.4
Space Shuttle Operations	223.3	NA	37.8	103.8	108.1	86.6
NAVY						
Fleet Satellite Communications (Fltsatcom)	$ 50.4	NA	$ 60.1	$ 11.9	$213.9	$ 9.9
JOINT PROGRAMS						
Strategic Defense Initiative	$ —	$2,678.1	$ —	$3,743.4	$ —	$5,220.8

Source: "Program Acquisition Costs by Weapon System," "Procurement Program (P-1)," and "R,D,T&E Programs (R-1)," Department of Defense Budget (Annually).

[a] Total Obligational Authority.

E Estimate. Latest year reflects Administration's budget proposal.

NA Not available.

STRATEGIC DEFENSE INITIATIVE ORGANIZATION BUDGET PROGRAM

Fiscal Years 1986-1989
(Millions of Dollars)

Program	1986	1987^{E*}	1988^{E}	1989^{E}
TOTAL	$2,687.2	$3,753.7	$5,220.8	$6,282.0
Surveill, Acquisit, Tracking & Kill Assess—TOTAL	$ 846.7	$ 924.6	$1,492.7	$1,859.5
Radar Discrimination Technology & Data Base	21.0	12.7	22.6	34.7
Optical Discrimination Technology & Data Base	117.7	90.6	87.9	80.1
Imaging Radar Technology	30.5	26.2	32.0	38.1
Imaging Laser Technology (Optical)	75.4	96.4	148.3	177.6
IR Sensor Technology	82.2	78.7	93.7	98.8
Booster Surveill & Tracking System Experiment	81.1	130.1	256.1	344.7
Space Surveillance & Tracking System Experiment	49.0	47.6	191.8	242.2
Optical Surveillance Experiment	134.9	99.5	104.0	140.7
Terminal Imaging Radar Experiment	31.8	26.3	117.0	136.4
SATKA Integrated Experiment	95.0	149.6	248.0	311.2
Signal Processing Technology	94.7	105.9	134.6	145.1
Countermeasures	0.7	0.8	—	—
Innovative Science & Technology	25.4	42.1	24.5	48.4
Shuttle Recovery	—	13.6	—	—
Directed Energy Weapons Technology—TOTAL	803.4	843.6	1,103.7	1,245.8
Technology Base Development	437.4	339.7	340.5	408.6
Technology Integration Experiments	309.5	402.1	587.9	646.1
Concept Formulation & Technical Development Planning	24.0	26.8	32.3	28.0
Support Programs	32.5	62.4	115.0	128.2
Innovative Science & Technology	—	12.7	28.0	35.0
Kinetic Energy Weapons Technology—TOTAL	595.8	729.6	1,074.7	1,199.7
Endoatmospheric Nonnuclear Kill Technology	76.7	111.3	237.6	238.8
Exoatmospheric Nonnuclear Kill Technology	61.6	107.6	220.6	307.6
Space Based Kinetic Kill Vehicle (KKV) Systems	134.4	126.8	303.5	357.4
Mini Projectiles	56.0	74.5	102.9	134.7
Test & Evaluation	185.9	252.1	109.3	46.9
Allied/Theater Defense	69.9	44.3	72.9	79.2
Innovative Science & Technology	11.4	13.0	28.0	35.0

(Continued on Next Page)

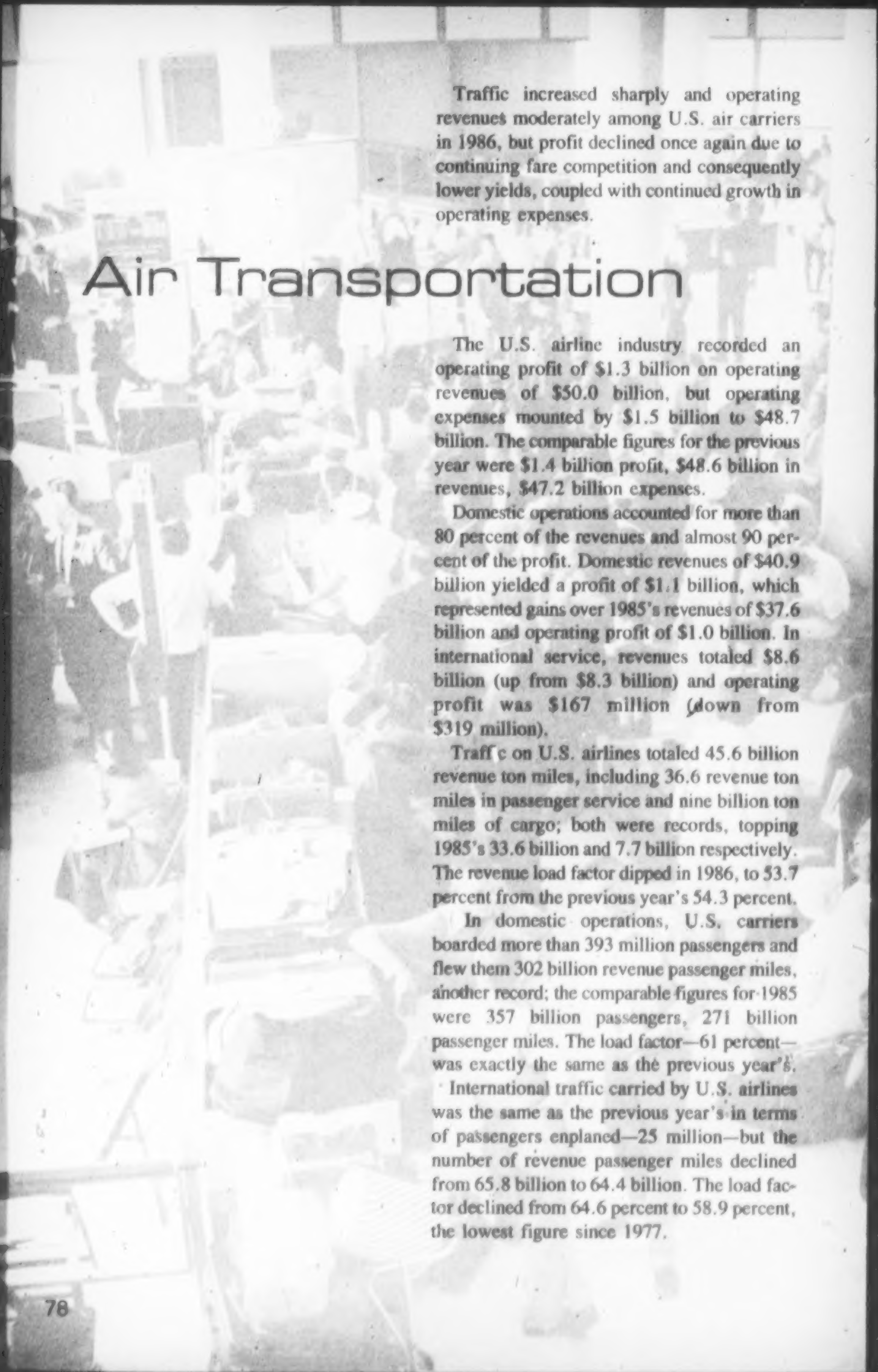
STRATEGIC DEFENSE INITIATIVE ORGANIZATION BUDGET PROGRAM (Continued)

Program	1986	1987[E]	1988[E]	1989[E]
Systems Concepts/Battle Management—TOTAL	212.3	386.9	627.3	787.5
SDI Strategic Architecture	63.5	58.4	91.0	78.0
SDI Systems Engineering	12.1	20.2	39.0	53.6
Theater Architecture	1.7	39.8	38.4	37.9
National Test Bed	12.0	60.6	119.2	228.4
BM/C^3 Technology	70.9	88.5	121.8	134.1
BM/C^3 Experimental Systems	23.4	80.7	172.9	203.5
Countermeasures	6.1	5.0	—	—
Innovative Science & Technology	13.4	18.1	28.0	35.0
Civil Applications	—	2.0	2.0	2.0
Medical Free Electron Laser	9.2	13.5	15.0	15.0
Survivability, Lethality & Key Technologies—TOTAL	215.6	338.0	900.4	1,162.2
System Survivability	59.4	60.0	94.2	98.3
Lethality & Target Hardening	78.3	78.0	102.5	98.4
Space Power & Power Conversion	50.0	85.7	158.0	186.9
Space Transportation & Support	20.7	36.4	433.8	606.2
Materials and Structures	—	14.3	22.5	40.5
Countermeasures	8.7	23.2	42.8	78.4
IS & T	—	18.2	28.0	35.0
HELSTF	—	18.8	18.5	18.5
Management Headquarters—TOTAL	13.1	19.9	22.0	27.3
Management Headquarters	13.1	19.9	22.0	27.3

Source: U.S. Government, "Report to The Congress on the Strategic Defense Initiative, 1987," and Department of Defense, "R, D, T&E Programs (R-1)."

NOTE: Detail may not add to totals because of rounding.

[E] Estimate. Latest two years represent Administration's budget proposal.



Traffic increased sharply and operating revenues moderately among U.S. air carriers in 1986, but profit declined once again due to continuing fare competition and consequently lower yields, coupled with continued growth in operating expenses.

Air Transportation

The U.S. airline industry recorded an operating profit of $1.3 billion on operating revenues of $50.0 billion, but operating expenses mounted by $1.5 billion to $48.7 billion. The comparable figures for the previous year were $1.4 billion profit, $48.6 billion in revenues, $47.2 billion expenses.

Domestic operations accounted for more than 80 percent of the revenues and almost 90 percent of the profit. Domestic revenues of $40.9 billion yielded a profit of $1.1 billion, which represented gains over 1985's revenues of $37.6 billion and operating profit of $1.0 billion. In international service, revenues totaled $8.6 billion (up from $8.3 billion) and operating profit was $167 million (down from $319 million).

Traffic on U.S. airlines totaled 45.6 billion revenue ton miles, including 36.6 revenue ton miles in passenger service and nine billion ton miles of cargo; both were records, topping 1985's 33.6 billion and 7.7 billion respectively. The revenue load factor dipped in 1986, to 53.7 percent from the previous year's 54.3 percent.

In domestic operations, U.S. carriers boarded more than 393 million passengers and flew them 302 billion revenue passenger miles, another record; the comparable figures for 1985 were 357 billion passengers, 271 billion passenger miles. The load factor—61 percent—was exactly the same as the previous year's.

International traffic carried by U.S. airlines was the same as the previous year's in terms of passengers enplaned—25 million—but the number of revenue passenger miles declined from 65.8 billion to 64.4 billion. The load factor declined from 64.6 percent to 58.9 percent, the lowest figure since 1977.

The U.S. airline fleet numbered 4,909 multi-engine airplanes at the end of 1986, 231 more than at the end of the previous year. Turbojet aircraft numbered 3,283, about two-thirds of the total; the fleet also included 1,204 turboprops (up from 1,076), 420 piston-engine transports (down from 433) and two helicopters (down from five).

Worldwide airline traffic and operating revenues increased substantially among airlines of the International Civil Aviation Organization (ICAO) countries but profit, expressed as a percentage of revenues, remained at the previous year's level of 3.7 percent. In dollar terms, it amounted to $4.5 billion, which compares with $4.1 billion in 1985 and $5.1 billion in 1984. ICAO airlines boarded 950 million passengers, an increase of six percent over 1985's 897 million; they flew 897 billion passenger miles, a gain of 48 billion (5.7 percent) over the previous year. Overall passenger load factor dipped to 65 percent from 66 percent in 1985.

The world fleet of turbine engine aircraft in airline service increased by more than 500 units, according to Exxon International's annual survey, which covers all aircraft except those of the Soviet Union's Aeroflot. Exxon reported a total of 10,999 transports, which compares with 10,496 in the previous year. The 1986 figure breaks down this way: turbojets, 7,188 (up from 6,900); turboprops, 3,546 (up from 3,350); turbine- powered helicopters, 265 (up from 246).

Despite intense competition from foreign companies for sales of airline transports, U.S. manufacturers continued to hold their own in terms of the number and percentage of U.S.-built aircraft in the world fleet. As of March 31, 1986, there were 7,240 turbine-powered aircraft of U.S. manufacture flying with the world's airlines; that represented 65.8 percent of the total, compared with 66.0 percent in the previous year. Among turbojet aircraft, 5,971 or 83.1 percent were U.S.-built; the comparable figures for 1985 were 5,770 and 83.6 percent. U.S. manufacturers built only 1,072 or 30.2 percent of the turboprops operating in 1986 but those figures were higher than the previous year's 983, 29.3 percent. Of the 265 turbine-powered helicopters, 197 (74.3 percent) were of U.S. manufacture; the figures for the prior year were 246 total, 177 U.S.-built, 72.0 percent.

OPERATING REVENUES AND EXPENSES OF WORLD SCHEDULED AIRLINES[a]

Calendar Years 1981-1986
(Millions of U.S. Dollars)

	1981	1982	1983	1984	1985	1986[p]
OPERATING REVENUES:						
Scheduled Services:						
Passenger	$74,433	$74,860	$77,600	$ 81,720	$ 87,000	NA
Freight	9,523	9,560	10,830	12,560	13,300	
Mail	1,425	1,480	1,470	1,500	1,700	
Total Schedule Services	$85,381	$85,900	$89,900	95,780	102,000	
Non-Scheduled Services	3,682	3,100	2,800	3,010	3,500	
Incidental	3,929	4,240	5,600	6,610	6,700	
Total Operating Revenues	$92,992	$93,240	$98,300	$105,400	$112,200	$123,000
OPERATING EXPENSES:						
Flight Operations	$36,676	$34,600	$33,050	$ 33,350	34,930	NA
Maintenance & Overhaul	9,640	9,150	9,620	10,120	11,070	
Depreciation & Amortization	5,968	6,330	6,920	7,240	7,770	
User Charges & Station Expenses	13,828	14,540	15,260	16,080	17,340	
Passenger Services	8,085	8,540	8,810	9,190	10,310	
Ticketing, Sales & Promotion	13,800	14,510	15,810	16,560	18,470	
General, Administrative & Other	5,687	5,730	6,730	7,760	8,210	
Total Operating Expenses	$93,684	$93,400	$96,200	$100,300	$108,100	$118,500
OPERATING RESULT	$ (692)	$ (160)	$ 2,100	$ 5,100	$ 4,100	$ 4,500
Percent of Revenue	(0.7%)	(0.2%)	2.1%	4.8%	3.7%	3.7%
NET RESULT[b]	$(1,150)	$(1,300)	$(700)	$ 2,000	$ 2,100	NA
Percent of Revenue	(1.2%)	(1.4%)	(0.7%)	1.9%	1.9%	NA

Source: International Civil Aviation Organization.
NOTE: Data in parentheses represent negative values.
[a] Excludes domestic operations in the USSR.
[b] Net Result equals Operating Result minus non-operating items, including interest, income taxes, retirement of property and equipment, affiliated companies and subsidies.
NA Not available.
[p] Preliminary.
[r] Revised.

TRAFFIC STATISTICS
WORLD AIRLINE SCHEDULED SERVICE[a]
Calendar Years 1970-1986

Year	Passengers Carried	Freight Tons Carried	Passenger-Miles Performed	Seat-Miles Available	Passenger Load Factor	Ton-Miles Performed: Freight	Ton-Miles Performed: Mail	Ton-Miles Performed: TOTAL (Passengers & Baggage, Freight, Mail)
	(Millions)		(Billions)		(Percent)	(Millions)		
1970	383	6.7	286	522	55%	8,230	2,110	38,820
1971	411	7.4	307	568	54	9,060	1,990	41,420
1972	450	8.0	348	610	57	10,290	1,900	46,690
1973	489	9.0	384	667	58	12,010	1,970	51,900
1974	515	9.6	407	688	59	13,030	1,970	55,270
1975	534	9.6	433	733	59	13,270	1,990	58,080
1976	576	10.3	475	789	60	14,750	2,080	63,880
1977	610	11.0	508	836	61	16,180	2,180	68,790
1978	679	11.7	582	902	65	17,770	2,240	77,770
1979	754	12.1	659	999	66	19,180	2,350	86,900
1980[r]	748	12.2	677	1,071	63	20,120	2,520	89,710
1981[r]	752	12.0	695	1,091	64	21,150	2,600	92,800
1982[r]	765	12.8	710	1,115	64	21,600	2,650	94,940
1983[r]	797	13.5	739	1,151	64	24,050	2,740	100,260
1984[r]	846	14.7	794	1,224	65	27,160	2,950	108,950
1985	897	15.1	849	1,291	66	27,300	3,010	114,800
1986[p]	950	16.2	897	1,375	65	29,600	3,080	121,920

Source: International Civil Aviation Organization (ICAO).

[a] Includes international and domestic traffic on scheduled service performed by the airlines of the 157 States which were members of ICAO in 1986.

[r] Revised.

[p] Preliminary.

OPERATING REVENUES AND EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1962-1986 (Millions of Dollars)

Year	TOTAL OPERATIONS[b]			Domestic Operations			International Operations		
	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)
1962	$ 3,439	$ 3,249	$ 190	$ 2,589	$ 2,488	$ 100	$ 850	$ 760	$ 90
1963	3,759	3,479	280	2,790	2,646	144	969	833	136
1964	4,251	3,781	470	3,169	2,849	320	1,082	932	150
1965	4,958	4,286	672	3,691	3,239	452	1,267	1,047	220
1966	5,745	4,970	775	4,171	3,670	502	1,574	1,300	274
1967	6,865	6,157	708	4,981	4,560	421	1,884	1,597	287
1968	7,753	7,248	505	5,691	5,397	295	2,062	1,852	210
1969	8,791	8,403	387	6,936	6,613	322	1,855	1,790	65
1970	9,290	9,247	43	7,180	7,181	(1)	2,109	2,066	44
1971	10,046	9,717	328	7,753	7,496	257	2,292	2,221	71
1972	11,163	10,578	584	8,652	8,158	493	2,512	2,420	91
1973	12,419	11,834	585	9,694	9,200	494	2,725	2,633	91
1974	14,703	13,978	725	11,546	10,761	785	3,157	3,218	(60)
1975	15,356	15,229	128	12,020	11,902	117	3,336	3,326	11
1976	17,503	16,781	721	13,899	13,324	575	3,605	3,457	147
1977	19,926	19,018	908	15,822	15,166	657	4,104	3,852	252
1978	22,892	21,527	1,366	18,189	17,172	1,018	4,703	4,355	348
1979	27,227	27,028	199	21,652	21,523	129	5,575	5,505	69
1980	33,728	33,949	(222)	26,404	26,409	(6)	6,543	6,766	(223)
1981	36,211	36,612	(401)	28,788	29,051	(264)	6,390	6,574	(184)
1982	36,066	36,804	(739)	28,728	29,478	(750)	6,435	6,452	(17)
1983	38,593	38,231	362	31,014	31,186	(171)	7,163	6,693	470
1984	44,060	41,946	2,114	35,394	33,812	1,582	7,975	7,485	490
1985[r]	48,580	47,207	1,372	37,628	36,610	1,018	8,302	7,984	319
1986	49,987	48,725	1,262	40,921	39,833	1,088	8,616	8,449	167

Source: U.S. Department of Transportation Office of Aviation Information Management, Financial Data Branch.

NOTE: Detail may not add to totals because of rounding.

[a] Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

[b] For 1980 and subsequent years, includes 'Other' operations not reported as 'Domestic' or 'International.'

[r] Revised.

SOURCES OF OPERATING REVENUES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1972-1986
(Millions of Dollars)

Year	TOTAL Operating Revenues	Passenger Service[b]	Mail[c]	Freight[b] & Air Express	Excess Baggage	Other[c]
DOMESTIC OPERATIONS						
1972	$ 8,652	$ 7,686	$230	$ 618	$13	$ 105
1973	9,694	8,518	263	703	14	196
1974	11,546	9,903	264	772	17	589
1975	12,020	10,301	253	792	19	655
1976	13,899	12,104	294	942	22	537
1977	15,822	13,773	355	1,109	21	564
1978	18,189	15,753	336	1,347	23	730
1979	21,652	18,931	417	1,485	28	791
1980	26,404	23,317	446	1,582	32	1,027
1981	28,788	25,504	497	1,659	36	1,091
1982	28,728	25,440	524	1,505	42	1,218
1983	31,014	27,519	516	1,602	52	1,326
1984	35,393	31,437	552	1,690	70	1,644
1985[r]	37,628	33,044	733	1,528	78	2,245
1986	40,921	33,403	679	4,206	84	2,549
INTERNATIONAL OPERATIONS						
1972	$ 2,512	$ 1,906	$110	$ 449	$14	$ 32
1973	2,725	2,112	109	438	15	51
1974	3,157	2,353	118	542	21	122
1975	3,336	2,469	122	591	25	129
1976	3,605	2,665	112	626	27	175
1977	4,104	3,047	112	710	21	215
1978	4,703	3,534	117	750	20	282
1979	5,575	4,271	131	837	23	313
1980	6,543	4,984	175	1,011	25	348
1981	6,390	4,917	165	984	25	299
1982	6,435	4,959	177	990	25	284
1983	7,163	5,605	152	999	23	384
1984	7,975	6,074	158	1,169	27	547
1985[r]	8,302	6,098	160	1,009	28	1,007
1986	8,616	6,205	154	1,309	28	919

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch

NOTE: Detail may not add to totals because of rounding.

[a] Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

[b] Scheduled and charter.

[c] Subsidy included with Mail through 1979, and then included in Other, which also includes revenues not related to transport, plus, beginning in 1981, transport revenues not specifically broken out by category by some small carriers.

[r] Revised

OPERATING EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1972-1986
(Millions of Dollars)

Year	TOTAL Operating Expenses	Flying Operations	Maintenance	Passenger Service	Aircraft & Traffic Servicing	Promotion and Sales	Depreciation & Amortization	Other[b]
DOMESTIC OPERATIONS								
1972	$ 8,158	$ 2,348	$1,246	$ 855	$1,578	$ 943	$ 778	$ 411
1973	9,200	2,638	1,408	968	1,835	1,057	839	456
1974	10,761	3,345	1,514	1,027	2,026	1.178	871	799
1975	11,902	3,919	1,611	1,117	2,158	1,271	891	936
1976	13,324	4,448	1,816	1,260	2,443	1,495	927	935
1977	15,166	5,288	2,001	1,461	2,728	1,713	967	1,008
1978	17,172	5,669	2,155	1,711	3,120	2,040	1,231	1,246
1979	21,523	7,998	2,457	2,091	3,702	2.564	1,373	1,337
1980	26,409	11,029	2,758	2,329	4,051	3,096	1,586	1,560
1981	29,051	12,037	2,822	2,522	4,497	3,708	1,723	1,742
1982	29,478	11,529	2,709	2,668	4,665	4,160	1,876	1,869
1983	31,186	11,370	2,878	2,983	5,104	4,764	2,107	1,980
1984	33,812	12,161	3,176	3,192	5,369	5,310	2,223	2,380
1985[r]	36,610	12,684	3,604	3,464	5,781	6,089	2,318	2,670
1986	39,833	11,334	4,462	3,787	7,662	6,807	2,651	3,130
INTERNATIONAL OPERATIONS								
1972	$ 2,420	$ 674	$ 325	$ 271	$ 434	$ 351	$ 225	$ 140
1973	2,633	752	338	302	501	368	225	148
1974	3,218	1,136	381	295	538	386	230	252
1975	3,326	1,175	392	292	565	422	225	254
1976	3,457	1,215	399	300	597	473	205	268
1977	3,852	1,303	450	351	668	526	253	301
1978	4,355	1,351	498	427	768	623	323	363
1979	5,505	1.960	571	538	922	774	352	388
1980	6,766	2,775	616	600	1,049	917	385	423
1981	6,574	2,757	540	583	932	945	382	435
1982	6,452	2,596	512	577	893	954	396	525
1983	6,693	2,490	548	664	936	1,162	389	505
1984	7,485	2,629	677	749	975	1,308	446	701
1985[r]	7,984	2,738	768	852	1,069	1,414	482	662
1986	8,449	2,396	900	877	1,386	1,665	517	708

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch.
NOTE: Detail may not add to totals because of rounding.

[a] Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

[b] General and administrative, and other transport-related expenses.

[r] Revised.

U.S. AIR CARRIERS
TOTAL ASSETS AND INVESTMENT IN EQUIPMENT

Calendar Years 1966-1986
(Millions of Dollars)

Year	TOTAL Assets	Value of Flight Equipment	Value of Ground Property & Equipment, & Other[a]	Less: Reserves for Depreciation & Overhaul	Equals: Net Value of Owned Operating Property & Equipment	Investment in Operating Property and Equipment as a Percent of Total Assets
1966	$ 7,310	$ 6,096	$ 856	$ 2,457	$ 4,495	61.5%
1967	9,344	7,568	1,064	2,773	5,859	62.7
1968	10,992	9,021	1,269	3,009	7,281	66.2
1969	12,069	9,943	1,516	3,560	7,899	65.4
1970	12,913	10,950	1,951	4,120	8,782	68.0
1971	12,998	11,221	2,028	4,649	8,600	66.2
1972	13,635	11,918	2,225	5,115	9,028	66.2
1973	14,464	12,908	2,424	5,693	9,639	66.6
1974	15,200	13,538	2,539	6,252	9,826	64.6
1975	15,064	14,035	2,635	6,823	9,847	65.4
1976	15,454	14,399	2,792	7,585	9,605	62.2
1977	16,869	14,822	2,997	8,141	9,679	57.4
1978	20,745	16,127	3,367	8,799	10,696	51.6
1979	24,907	18,561	3,985	9,746	12,800	51.4
1980	28,900	20,859	4,682	10,309	15,233	52.7
1981	30,513	22,375	5,175	11,028	16,521	54.1
1982	31,525	23,786	5,424	11,405	17,804	56.5
1983	35,213	26,588	6,191	12,910	19,868	56.4
1984	36,769	28,509	6,061	14,043	20,527	55.8
1985[r]	40,978	30,402	6,772	15,467	21,707	53.0
1986	47,001	31,674	8,471	14,749	25,396	54.0

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch.

[a] Includes land and construction in progress.

[r] Revised.

TRAFFIC STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE[a]
Calendar Years 1962-1986

Year	Revenue Ton Miles (Millions)			Total Available Ton Miles (Millions)	Total Revenue Load Factor	Aircraft Revenue Miles (Millions)	Average Over-All Flight Stage Length (Miles)	Average Available Seats per Aircraft Mile
	Passenger	Cargo[b]	Total					
1962	4,210	1,360	5,570	11,468	48.6%	1,010	276	86
1963	4,839	1,507	6,346	13,257	47.9	1,095	289	91
1964	5,630	1,803	7,434	15,514	47.9	1,189	301	93
1965	6,629	2,356	8,986	18,408	48.8	1,354	322	96
1966	7,736	2,949	10,686	20,939	51.0	1,482	339	98
1967	9,561	3,475	13,036	26,968	48.3	1,834	371	101
1968	11,023	4,226	15,249	33,221	45.9	2,146	401	107
1969	12,197	4,701	16,898	38,664	43.7	2,385	443	112
1970	13,171	4,994	18,166	41,693	43.6	2,426	473	117
1971	13,565	5,120	18,685	44,139	42.3	2,378	476	125
1972	15,241	5,506	20,746	45,583	45.5	2,376	471	129
1973	16,196	6,046	22,242	49,019	45.4	2,448	477	135
1974	16,292	6,133	22,425	46,848	47.9	2,258	478	140
1975	16,281	5,905	22,186	47,254	46.9	2,241	476	143
1976	17,899	6,222	24,121	49,325	48.9	2,320	480	146
1977	19,322	6,587	25,909	52,284	49.6	2,419	490	149
1978	22,678	7,001	29,679	54,765	54.2	2,520	502	152
1979	26,202	7,189	33,390	60,844	54.9	2,791	517	154
1980	25,519	7,084	32,603	62,983	51.8	2,816	526	158
1981	24,889	7,060	31,949	61,186	52.2	2,703	519	161
1982	25,964	6,886	32,850	62,401	52.6	2,699	544	167
1983	28,183	7,573	35,756	65,385	54.7	2,809	558	169
1984	30,512	8,185	38,697	72,223	53.6	3,134	575	168
1985[r]	33,640	7,689	41,329	76,059	54.3	3,320	569	168
1986	36,629	9,017	45,646	85,054	53.7	3,719	580	168

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch.
NOTE: Detail may not add to totals because of rounding.
[a] Includes international and domestic operations.
[b] Includes freight, air express, U.S. and foreign mail.
[r] Revised.

PASSENGER STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE
DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1972-1986

Year	Revenue Passenger Enplanements (Thousands)	Average Passenger Trip-Length (Miles)	Revenue Passenger Miles (Millions)	Available Seat Miles (Millions)	Revenue Passenger Load Factor[a]
DOMESTIC OPERATIONS					
1972	172,452	685	118,138	226,614	52.1%
1973	183,272	689	126,317	244,699	51.6
1974	189,733	684	129,732	233,880	55.5
1975	188,746	698	131,728	241,282	54.6
1976	206,279	704	145,271	261,248	55.6
1977	222,283	705	156,609	280,619	55.8
1978	253,957	719	182,669	299,542	61.0
1979	292,700	714	208,891	332,796	62.8
1980	272,829	736	200,829	346,028	58.0
1981	265,304	749	198,715	346,172	57.4
1982	274,342	766	210,149	359,528	58.5
1983	296,721	765	226,909	379,150	59.8
1984	321,047	759	243,692	422,507	57.7
1985[r]	357,109	758	270,584	445,826	60.7
1986	393,422	767	301,838	497,439	60.7
INTERNATIONAL OPERATIONS					
1972	18,897	1,813	34,268	60,797	56.4%
1973	18,936	1,882	35,640	65,898	54.1
1974	17,725	1,872	33,186	63,126	52.6
1975	16,316	1,905	31,082	61,724	50.4
1976	17,039	1,979	33,717	61,574	54.8
1977	18,043	2,029	36,610	64,947	56.4
1978	20,759	2,125	44,112	69,209	63.7
1979	24,163	2,199	53,132	83,330	63.8
1980	24,074	2,258	54,363	86,507	62.8
1981	20,672	2,427	50,173	78,725	63.7
1982	19,760	2,505	49,495	80,591	61.4
1983	21,917	2,506	54,920	85,388	64.3
1984	23,636	2,599	61,424	92,817	66.2
1985[r]	24,913	2,642	65,819	101,963	64.6
1986	25,071	2,570	64,445	109,409	58.9

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch.

[a] Revenue passenger miles as a percent of available seat miles.

[r] Revised.

TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

By Model
Years 1982-1986

	1982	1983	1984	1985	1986
TOTAL AIRCRAFT IN SERVICE	9,220	9,643	10,248	10,496	10,999
Turbojets—TOTAL	6,275	6,462	6,802	6,900	7,188
Aerospatiale SE-210 Caravelle	93	105	100	89	67
Aerospatiale SN-601 Corvette	11	10	12	12	11
Airbus A300	168	206	220	237	247
Airbus A310	—	4	29	50	79
B.Ae. 111	156	155	154	156	162
B.Ae. 146	—	—	10	21	37
B.Ae. HS-125	9	9	10	11	14
B.Ae./Aerospatiale Concorde	14	14	14	14	14
B.Ae. Trident	71	71	65	48	34
Boeing 707/720	512	435	365	322	284
Boeing 727	1,636	1,602	1,696	1,658	1,678
Boeing 737	779	879	940	1,008	1,135
Boeing 747	517	533	556	571	597
Boeing 757	—	10	33	56	89
Boeing 767	—	37	79	106	133
Cessna 500/550/650 Citation I/II	25	22	26	36	29
Convair 880/990	13	15	14	11	10
Dassault Falcon 10/20/50	40	46	43	28	32
Dassault Mercure	10	10	10	11	11
Fokker F-28 Fellowship	133	124	151	171	189
Gates Learjet	21	27	27	32	30
Gulfstream II/III G-1159	16	14	15	15	13
Ilyushin IL-62	47	47	48	52	56
Ilyushin IL-76	11	17	37	36	42
Israel Aircraft 1121/1124	10	12	9	4	8
Lockheed L-1329 JetStar	7	7	8	8	7
Lockheed L-1011 TriStar	215	224	231	222	217
MBB Hansa HFB-320	—	—	1	—	1
McDonnell Douglas DC8	301	336	337	302	244
McDonnell Douglas DC-9/ MD-80	941	971	1,021	1,066	1,149
McDonnell Douglas DC-10	342	346	346	357	356
Rockwell/Sabreliner 60	—	—	1	—	—
Tupolev Tu-124	2	2	—	—	—
Tupolev Tu-134	89	86	95	95	98
Tupolev Tu-154	38	39	47	45	57
Yakolev Yak-40/42	48	47	52	50	58
Turboprops—TOTAL	2,697	2,956	3,191	3,350	3,546
Aerospatiale N.262 Mohawk 298	22	30	35	31	28
Aerospatiale/Aeritalia ATR 42	—	—	—	—	10
Antonov An.12	8	8	11	9	11
Antonov An.24/26/30	149	159	152	143	163
B.Ae. (HP-137) Jetstream 31	17	18	33	49	88

(Continued on next page)

TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET (Continued)

By Model
1982-1986

	1982	1983	1984	1985	1986
Turboprops (continued)					
B.Ae. Vanguard	9	8	10	10	7
B.Ae. Viscount	78	67	94	87	68
B.Ae. HS-748	151	154	151	156	155
Beech 18-TP Conv.	—	1	6	12	8
Beech 99	128	146	163	174	179
Beech 90 King Air	20	24	29	36	39
Beech 100 King Air	8	7	8	9	13
Beech 200 King Air	22	44	43	42	53
Beech 1900	—	—	5	35	42
Bristol 175 Britannia	10	8	7	8	8
Canadair CL-44	8	12	17	17	16
CASA/Nurtanio C-212 Aviocar	60	66	91	106	105
Cessna 208 Caravan I	—	—	—	3	64
Cessna 425/441 Conquest I/II	6	13	16	17	16
Convair 580/600/640	156	156	141	149	146
DHC-2 Turbo Beaver	8	11	11	11	9
DHC-5 Buffalo	—	2	2	2	2
DHC-6 Twin Otter	449	464	488	468	455
DHC-7 Dash 7	59	78	85	89	90
DHC-8 Dash 8	—	—	—	2	21
Dornier DO 128 Turbo-Skyservant	1	1	1	1	—
Dornier DO-228	—	5	18	31	39
Douglas DC-3T Turbo Express	—	—	1	1	1
Embraer EMB-110 Bandeirante	189	220	232	217	207
Embraer EMB-120 Brasilia	—	—	—	—	8
Fokker/Fairchild F-27/FH-227 Friendship	377	405	411	426	434
GAF Nomad	42	34	25	23	23
Grumman G-159 Gulfstream I	15	20	23	28	26
Grumman G-73 Turbo Mallard	1	6	6	6	7
Grumman G-21C Turbo Goose	2	1	—	—	—
Handley Page Herald	34	34	27	22	15
Hawker-Siddeley Argosy	5	7	7	7	7
Ilyushin IL-18	72	74	75	74	72
Israel Aircraft Arava 101B	3	5	1	—	—
Lockheed L-188 Electra	88	85	84	91	76
Lockheed L-100/L-382 Hercules	49	51	59	62	60
Mitsubishi MU-2B	13	17	17	10	10
NAMC YS-11	114	113	118	118	117
Pilatus PC-6 Turbo Porter	8	9	27	30	33
Pilatus Britten-Norman BN-2T Turbo Islander	—	—	5	5	5
Piper PA-31T/42 Cheyenne	8	10	12	16	21
Piper T-1040	—	1	4	7	11
Rockwell Turbo Commander	9	10	8	6	10
Saab SF-340	—	—	—	16	39
Saunders ST-27	9	9	10	10	10
Shorts SC-5 Belfast	3	5	5	5	5

(Continued on next page)

TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET (Continued)

By Model
1982-1986

	1982	1983	1984	1985	1986
Turboprops (continued)					
Shorts SC-7 Skyliner/Skyvan	36	37	34	27	29
Shorts 330	72	88	81	81	76
Shorts 360	—	7	41	66	78
Swearingen Merlin	4	2	17	26	30
Swearingen Metro	169	218	234	263	291
Transall C-160	6	6	9	9	9
Xian (Antonov) Y-7	—	—	1	1	1
Turbine-Powered Helicopters—TOTAL	248	225	255	246	265
Aerospatiale SA-315 Lama	3	7	5	5	3
Aerospatiale SA-316 Alouette III	—	3	12	12	12
Aerospatiale SA-318 Alouette II	2	1	2	1	1
Aerospatiale SA-319 Alouette III Astazou	—	1	2	2	2
Aerospatiale (Nurtanio) SA-330 Puma	2	—	19	19	18
Aerospatiale AS-332 Super Puma	1	1	5	5	5
Aerospatiale AS-335	—	—	—	—	1
Aerospatiale SA-341 Gazelle	2	—	—	—	—
Aerospatiale AS-350 Ecureuil/AStar	1	3	5	5	5
Aerospatiale AS-355 Ecureuil 2/Twinstar	2	1	2	2	2
Aerospatiale SA-360 Dauphin	7	8	8	—	—
Aerospatiale SA-365 Dauphin II	—	1	8	8	9
Bell (Agusta/Fuji) 204	13	10	12	10	8
Bell 205	6	6	6	6	6
Bell 206 Jetranger/Longranger	81	35	32	46	52
Bell 212	15	15	14	14	27
Bell (Fuji) 214/214ST	4	7	7	7	6
Bell 222 UT	—	—	—	4	5
Bell 412	—	—	1	4	5
Boeing Vertol 234 Chinook	6	6	6	4	4
Hughes (Kawasaki) 500	24	30	22	15	13
Kawasaki BK 117	—	—	—	—	1
M.B.B./Nurtanio Bo. 105	9	7	7	7	9
Sikorsky S-55T	3	3	3	3	3
Sikorsky S-58T	13	15	14	12	11
Sikorsky S-61	42	44	42	36	37
Sikorsky S-76	11	16	15	15	20
Westland 30	1	5	6	3	—

Source: Exxon International Company, "Air World Survey," compiled by Aviation Data Service, Inc. (Annually).
NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and covers aircraft in service as of March 31. Excludes air taxi operators.

U.S. TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

Calendar Years 1982-1986

	1982	1983	1984	1985	1986
TOTAL AIRCRAFT IN SERVICE	9,220	9,643	10,248	10,496	10,999
Number Manufactured in U.S.	6,228	6,440	6,728	6,930	7,240
Percent Manufactured in U.S.	67.5%	66.8%	65.7%	66.0%	65.8%
Turbojet Aircraft in Service	6,275	6,462	6,802	6,900	7,188
Number Manufactured in U.S. ..	5,325	5,458	5,695	5,770	5,971
Percent Manufactured in U.S. ..	84.9%	84.5%	83.7%	83.6%	83.1%
Turboprop Aircraft in Service ...	2,637	2,956	3,191	3,350	3,546
Number Manufactured in U.S. ..	685	795	859	983	1,072
Percent Manufactured in U.S. ..	25.4%	26.9%	26.9%	29.3%	30.2%
Turbine-Powered Helicopters In Service	248	225	255	246	265
Number Manufactured in U.S. ..	218	187	174	177	197
Percent Manufactured in U.S. ..	87.9%	83.1%	68.2%	72.0%	74.3%

Source: Exxon International Company, "Air World Survey," compiled by Aviation Data Service, Inc. (Annually).
NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and includes aircraft in service as of March 31. Excludes air taxi operators.

JET FUEL COSTS AND CONSUMPTION BY U.S. AIR CARRIERS[a]

Calendar Years 1972-1986

Year	Gallons Consumed (Millions)	Total Cost (Millions)	Cost Per Gallon (Cents)	Cost Index (1972 = 100)	Cost of Fuel as Percent of Cash Operating Expenses
1972	10,100.8	$1,178.2	11.7¢	100.0	12.1%
1973	10,700.4	1,365.3	12.8	109.4	12.1
1974	9,565.2	2,333.5	24.4	209.2	17.3
1975	9,495.3	2,777.3	29.2	250.8	18.9
1976	9,820.8	3,116.1	31.7	272.0	19.2
1977	10,282.0	3,729.8	36.3	311.0	20.1
1978	10,627.1	4,178.2	39.3	337.1	19.7
1979	11,278.1	6,503.0	57.7	494.4	24.4
1980	10,874.0	9,769.5	89.8	770.3	29.7
1981	10,087.8	10,498.0	104.1	892.2	29.3
1982	9,935.4	9,755.2	98.2	841.8	27.2
1983	10,207.8	9,073.1	88.9	762.0	24.5
1984	11,006.6	9,361.7	85.1	729.2	23.9
1985	11,595.1	9,326.7	80.4	689.6	22.3
1986	12,527.3	6,901.9	55.1	472.4	16.4

Source: Air Transport Association of America

[a] Includes Majors and Nationals, per CAB classifications effective 1981, corresponding to previous categories of System Trunks and Local Service Carriers. Revised from previously reported data. Air Florida, Capitol and Transamerica not included in 1984 data, and excluded from prior year data for comparability.

U.S. CIVIL AND JOINT-USE AIRCRAFT FACILITIES[a] BY TYPE AND STATE

As of December 31, 1986

State	TOTAL[a]	Public[b]	Paved	Lighted	State	TOTAL[a]	Public[b]	Paved	Lighted
Alabama	183	104	129	98	Nevada	125	62	57	30
Alaska	614	440	58	131	New Hampshire	58	28	32	19
Arizona	262	79	144	69	New Jersey	286	66	116	64
Arkansas	167	98	104	80	New Mexico	168	73	78	53
California	895	280	628	271	New York	495	181	197	133
Colorado	323	86	155	102	N. Carolina	307	126	127	111
Connecticut	112	28	65	31	N. Dakota	499	100	75	96
Delaware	37	12	14	14	Ohio	697	214	256	201
Dist. of Col.	15	2	12	4	Oklahoma	341	171	176	139
Florida	594	133	246	154	Oregon	351	109	143	85
Georgia	325	118	172	119	Pennsylvania	755	161	269	155
Hawaii	51	14	39	12	Rhode Island	20	8	14	6
Idaho	205	118	71	41	S. Carolina	137	72	67	62
Illinois	894	125	225	174	S. Dakota	161	76	51	75
Indiana	518	121	144	122	Tennessee	186	90	113	85
Iowa	279	149	129	156	Texas	1,628	403	793	432
Kansas	382	151	127	143	Utah	105	50	69	43
Kentucky	139	75	89	63	Vermont	61	20	17	9
Louisiana	357	95	195	80	Virginia	299	81	132	89
Maine	144	81	43	32	Washington	396	141	179	135
Maryland	155	44	69	46	W. Virginia	92	40	53	33
Massachusetts	141	51	91	43	Wisconsin	411	152	131	138
Michigan	419	223	173	171	Wyoming	102	46	45	36
Minnesota	472	161	119	140	**50 States-Total**	16,516	5,737	6,906	4,932
Mississippi	190	93	100	81	Puerto Rico	30	11	26	10
Missouri	429	154	188	147	Virgin Islands	8	2	3	3
Montana	203	127	87	82	S. Pacific[c]	28	25	13	9
Nebraska	331	105	100	97	**TOTAL**	16,582	5,775	6,948	4,954

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

[a] 16,582 aircraft facilities consist of 12,785 airports (5,434 for public use and 7,351 for private use), 3,336 heliports (115 for public use and 3,221 for private use), 69 stolports (9 for public use and 60 for private use), and 392 seaplane bases (217 for public use and 175 for private use). Included in these data are facilities having joint civil-military use.

[b] 'Public' refers to use, whether publicly or privately owned.

[c] American Samoa, Guam, and Trust Territories.

ACTIVE MULTI-ENGINE U.S. AIR CARRIER FLEET

By Type of Aircraft, Number of Engines and Model
Active as of December 1982-1986

	1982	1983	1984	1985	1986
TOTAL	4,072	4,203	4,370	4,678	4,909
Turbojets—TOTAL	2,674	2,767	2,959	3,164	3,283
Four-Engine—TOTAL	354	309	349	322	322
Boeing 707/720	56	25	22	27	35
Boeing 747	144	146	156	151	150
B.Ae. 146	—	3	14	29	25
Convair 880(22)/990(30)	3	2	—	—	—
McDonnall Douglas DC-8	151	133	157	115	112
Three-Engine—TOTAL	1,387	1,393	1,438	1,488	1,466
Boeing 727	1,110	1,122	1,161	1,195	1,172
Lockheed L-1011	111	116	103	114	114
McDonnell Douglas DC-10	166	155	174	179	180
Twin-Engine—TOTAL	933	1,065	1,172	1,354	1,495
Airbus A-300	30	34	38	46	52
Airbus A-310	—	—	—	4	7
Boeing 737	290	348	391	476	555
Boeing 757	2	15	19	48	73
Boeing 767	13	49	53	59	69
B.Ae. BAC-111	36	36	33	32	45
Canadair CL600	—	1	—	—	—
Cessna C500 Citation I	2	1	1	2	—
Dassault MD-20, Falcon	23	12	11	2	—
Fokker F-28	11	6	23	41	50
Grumman G-1159	2	1	1	—	—
Hamburger Flugzeugbau HF-320	—	1	—	—	—
Hawker-Siddeley HS125	2	—	—	—	—
Israel Westwind 1123/1124	—	1	—	—	—
Learjet LR-23/LR-24	4	—	—	—	—
Learjet LR-25	—	—	—	—	—
Learjet LR-35	3	4	8	3	1
Learjet LR36	1	—	—	—	—
McDonnell Douglas DC-9/MD-80	509	557	594	641	643
Rockwell NA-265 Sabreliner	1	—	—	—	—
Sud Aviation SE210 Caravelle	2	1	—	—	—
Turboprops—TOTAL	826	876	956	1,076	1,204
Four-Engine—TOTAL	116	99	109	108	96
Canadair CL44D	4	2	5	6	2
De Havilland DHC-7	43	46	46	42	40
Lockheed 188 Electra	47	37	34	38	33
Lockheed 382/L-100 Hercules	19	11	22	22	21
Vickers V745	3	3	2	—	—

(Continued on next page)

ACTIVE MULTI-ENGINE U.S. AIR CARRIER FLEET

By Type of Aircraft, Number of Engines and Model (Continued)

	1982	1983	1984	1985	1986
Twin-Engine—TOTAL	710	777	847	968	1108
Beech BE1900	—	—	17	42	60
Beech BE99	108	101	85	103	95
Beech BE90	4	2	2	3	1
Beech BE200	2	4	[illegible]	1	2
Beech STC 18	—	1	1	—	—
Beech 100	—	1	2	1	1
CASA C212 Aviocar	16	28	27	24	19
Cessna C441	2	1	3	1	3
Convair 580/600/640	98	100	107	100	91
DeHavilland DHC-6	101	112	107	86	68
DeHavilland DHC-8	—	—	—	10	26
Dornier DO 228	—	—	—	6	12
Douglas DC-3	—	—	—	1	—
Embraer EMB110/EMB120	83	83	81	79	107
Fairchild/Fokker F-27/FH-227	23	35	46	63	63
Fairchild Swearingen SA-226	105	99	121	113	122
Fairchild Swearingen SA-227	26	55	70	101	135
GAF N22/N24 Nomad	2	—	—	—	—
Grumman G-73	4	4	—	3	—
Grumman G-159	19	16	21	23	15
Handley Page HP-137	12	10	10	46	69
Hawker-Siddeley HS748	5	5	2	—	—
Israel Aircraft AR101B	3	—	—	—	—
Mitsubishi MU-2	—	2	4	3	6
Nihon YS-11	27	35	30	42	36
Nord ND-262/STC-262	15	9	14	14	15
Piper PA31T	1	6	8	4	5
Rockwell Aero Commander 690	—	1	4	4	4
Saab-Fairchild SF340A	—	—	3	17	34
Short SD-3/SD-330	52	66	78	77	110
Short SC-7	2	1	1	1	1
Societe Nationale Industrielle Aerospatiale SNAIS ATR-42	—	—	—	—	8
Piston-Engine—TOTAL	569	551	443	433	420
Four-Engine—TOTAL	57	52	50	38	32
DeHavilland DHC-114	16	11	6	—	—
Douglas DC-4	3	3	3	3	1
Douglas DC-6	38	38	41	34	30
Douglas DC-7	—	—	—	1	1
Three-Engine—TOTAL	—	—	4	4	3
Pilatus Britten-Norman BN2A-MK-3 Trislander	—	—	4	4	3
Twin-Engine—TOTAL	510	499	389	391	385
Helicopters—TOTAL	5	9	12	5	2

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation." (Annually).

NOTE: Effective 1978, includes certified route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1978 includes multi-engine aircraft in passenge service of commuters. "Active aircraft" must have a current U.S. registration and have been flown during the calendar year.

ACTIVE U.S. CIVIL AIRCRAFT[a]

As of December 31, 1961-1985

Year	TOTAL	Air Carrier[b]	General Aviation Aircraft					
			TOTAL	Fixed-Wing Aircraft			Rotorcraft[c]	Other[d]
				Multi-Engine	Single-Engine			
					4-place & over	3-place & less		
1961	82,736	2,104	80,632	8,401	38,206	32,800	798	427
1962	86,168	2,047	84,121	9,186	41,120	32,341	967	507
1963	87,167	2,079	85,088	9,695	42,647	30,977	1,171	588
1964	90,823	2,081	88,742	10,644	45,777	30,367	1,306	648
1965	97,567	2,125	95,442	11,977	49,789	31,364	1,503	809
1966	106,978	2,272	104,706	13,548	52,972	35,687	1,622	877
1967	116,638	2,452	114,186	14,651	56,865	39,675	1,899	1,096
1968	126,823	2,586	124,237	16,760	60,977	42,830	2,350	1,320
1969	133,496	2,690	130,806	18,111	63,703	45,001	2,557	1,434
1970	134,422	2,679	131,743	18,291	64,759	44,884	2,255	1,554
1971	133,790	2,642	131,148	17,855	64,464	44,792	2,352	1,685
1972	147,593	2,583	145,010	19,849	70,998	49,448	2,787	1,928
1973	156,139	2,599	153,540	21,929	74,831	51,386	3,143	2,251
1974	163,974	2,472	161,502	23,418	78,924	53,008	3,610	2,542
1975	170,970	2,495	168,475	24,559	82,621	54,390	4,073	2,832
1976	180,796	2,492	178,304	25,684	88,211	56,730	4,505	3,174
1977	186,767	2,473	184,294	26,652	91,960	57,340	4,726	3,616
1978	201,321	2,543	198,778	28,782	101,466	59,185	5,315	4,028
1979	213,948	3,609	210,339	31,311	106,028	62,362	5,864	4,770
1980	214,853	3,808	211,045	31,664	107,930	60,505	6,001	4,945
1981	217,196	3,970	213,226	33,301	107,983	59,914	6,974	5,049
1982	213,851	4,072	209,779	33,228	106,503	57,670	6,169	6,209
1983	217,496	4,203	213,293	34,404	107,228	59,199	6,540	5,923
1984	225,313	4,370	220,943	35,648	109,433	61,989	7,096	6,275
1985	215,332	4,678	210,654	33,588	105,555	58,829	6,418	6,263

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of estimating procedures.

[a] Before 1971, an active aircraft was one certified as eligible to fly. Currently, an "active aircraft" must have a current U.S. registration and have been flown during the previous calendar year.

[b] Effective 1978, includes certificated route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1979, includes multi-engine aircraft in commuter passenger service. Excludes single-engine aircraft as of 1978.

[c] Includes autogiros; excludes air carrier helicopters.

[d] Includes gliders, dirigibles and balloons.

ACTIVE U.S. CIVIL AIRCRAFT BY PRIMARY USE AND TYPE OF AIRCRAFT

As of December 31, 1985

Primary Use[a]	TOTAL	Fixed Wing			Rotor-craft[b]	Other[c]
		Turbojet	Turboprop	Piston		
TOTAL—ALL AIRCRAFT	215,332	7,539	6,483	188,624	6,423	6,263
Air Carrier—TOTAL	4,678	3,164	1,076	433	5	—
Certificated Route Air Carriers	2,860	2,740	110	10	—	—
Supplemental Air Carriers	195	109	58	28	—	—
Commercial Operators	54	21	24	9	—	—
Air Taxis	64	16	29	19	—	—
Commuters	1,275	117	816	337	5	—
All Cargo	188	119	39	30	—	—
Air Travel Clubs	42	42	—	—	—	—
General Aviation— TOTAL	210,654	4,375	5,407	188,191	6,418	6,263
Executive	13,610	3,169	2,983	6,495	901	62
Business	45,544	315	973	43,419	685	152
Commuter[d]	875	58	329	455	32	0
Air Taxi[d]	6,459	323	504	4,812	820	0
Instructional	14,410	2	65	13,474	463	406
Rental	7,919	66	29	7,409	36	379
Personal	103,053	125	124	97,779	768	4,257
Aerial Application	7,286	7	62	6,485	732	0
Aerial Observation	4,533	20	10	3,336	1,001	165
Other Work	1,620	0	3	1,176	274	167
Other	5,344	290	323	3,351	705	675

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation." (Annually)

NOTE: Detail may not add to totals because of estimating procedures.

[a] Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

[b] Includes helicopters and autogiros.

[c] Includes gliders, dirigibles and balloons.

[d] Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories included with "air carriers."

U.S. GENERAL AVIATION ACTIVE AIRCRAFT AND HOURS FLOWN BY PRIMARY USE

Calendar Years 1981-1985

Primary Use[a]	1981	1982	1983	1984	1985
ACTIVE AIRCRAFT AS OF DECEMBER 31					
TOTAL	213,226	209,779	213,293	220,943	210,654
Executive	18,582	15,739	17,064	16,675	13,610
Business	47,716	47,873	45,025	47,098	45,544
Commuter	1,023	1,070	1,479	1,232	875
Air Taxi	7,226	8,122	6,857	7,292	6,459
Instructional	14,993	14,708	15,450	15,287	14,410
Rental	10,585	9,844	7,674	9,406	7,919
Personal	95,510	94,820	101,484	105,309	103,053
Aerial Application[c]	7,976	7,155	7,051	7,332	7,286
Aerial Observation[c]	3,384	4,164	4,023	5,173	4,533
Other Work[c]	1,491	1,733	2,392	1,328	1,620
Other[c]	4,741	4,546	4,791	4,777	5,344
THOUSANDS OF HOURS FLOWN					
TOTAL	40,704	36,457	35,249	36,119	34,063
Executive	6,190	4,983	5,241	4,773	4,176
Business	8,122	6,861	5,956	6,635	6,534
Commuter[b]	979	1,086	1,602	1,504	674
Air Taxi[b]	2,809	3,187	2,528	3,019	2,719
Instructional	5,597	4,924	4,865	4,553	4,264
Rental	3,768	2,961	2,389	2,855	2,646
Personal	8,241	8,182	8,477	8,418	8,392
Aerial Application[c]	2,447	2,043	1,762	2,008	2,168
Aerial Observation[c]	1,402	1,256	1,138	1,314	1,315
Other Work[c]	369	467	642	312	343
Other[c]	769	638	553	729	831

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of rounding and estimating procedures.

[a] Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

[b] Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories classified as "air carriers."

[c] Prior to 1981, reported as Aerial Application (differently defined), Industrial, and Other.

U.S. GENERAL AVIATION
TYPE OF AIRCRAFT AND HOURS FLOWN

Calendar Years 1981-1985

	1981	1982	1983	1984	1985
Number of Active Aircraft by Type					
All Aircraft—TOTAL	213,226	209,779	213,293	220,943	210,654
Fixed Wing: Piston:					
Single Engine: 1-3 Seats	59,914	57,670	59,199	61,989	58,829
4+ Seats	107,983	106,503	107,228	109,933	105,555
Twin-Engine: 1-6 Seats	16,749	16,381	16,249	16,539	15,627
7+ Seats	8,607	8,501	8,660	8,719	8,032
Other	114	140	143	262	148
Turboprop:					
Twin Engine: 1-12 Seats	3,968	4,427	4,733	4,992	4,633
13+ Seats	557	610	578	640	607
Other	134	149	142	176	167
Turbojet: Twin Engine	2,808	3,309	3,447	3,780	3,914
Other	362	687	451	540	460
Rotorcraft: Piston	3,250	2,419	2,541	2,936	2,877
Turbine	3,724	3,749	3,998	4,160	3,541
Balloons, Dirigibles, and Gliders	5,049	5,233	5,923	6,275	6,263
Thousands of Hours Flown by Type of Aircraft					
All Aircraft—TOTAL	40,704	36,457	35,249	36,119	34,063
Fixed Wing: Piston	34,086	29,950	28,911	29,194	27,793
Turboprop	2,155	2,168	2,173	2,506	2,080
Turbojet	1,387	1,611	1,473	1,566	1,622
Rotorcraft: Piston	930	579	572	592	564
Turbine	1,754	1,771	1,700	1,903	1,590
Balloons, Dirigibles, and Gliders	391	379	420	358	414
Average Hours Flown per Year per Aircraft by Type					
All Aircraft—TOTAL	188	174	164	158	158
Fixed Wing: Piston:					
Single Engine: 1-3 Seats	171	146	140	139	135
4+ Seats	163	151	139	137	142
Twin-Engine: 1-6 Seats	215	187	187	181	174
7+ Seats	326	317	318	303	274
Other	197	247	240	433	184
Turboprop:					
Twin Engine: 1-12 Seats	398	356	301	342	319
13+ Seats	989	853	1,139	1,112	831
Other	499	394	579	339	396
Turbojet: Twin Engine	443	407	392	349	375
Other	377	385	274	393	325
Rotorcraft: Piston	285	237	221	187	192
Turbine	490	474	432	469	460
Balloons, Dirigibles, and Gliders	78	72	71	56	67

Source: General Aviation Manufacturers Association, "General Aviation Statistical Databook," (Annually), based on data from the Federal Aviation Administration.

NOTE: Detail may not add to totals because of rounding and/or estimating procedures.

ACTIVE U.S. AIRMAN CERTIFICATES HELD

As of December 31, 1982-1986

	1982	1983	1984	1985	1986
Pilots—TOTAL	733,255	718,004	722,376	709,540	709,118
Students	156,361	147,197	150,081	146,652	150,273
Private	322,094	318,643	320,086	311,086	305,736
Commercial	165,093	159,495	155,929	151,632	147,798
Airline Transport	73,471	75,938	79,192	82,740	87,186
Helicopter (only)	7,034	7,237	7,532	8,123	8,581
Glider (only)[a]	7,842	8,157	8,390	8,168	8,411
Lighter-Than-Air[a]	1,360	1,337	1,166	1,139	1,133
Non-Pilots—TOTAL	420,595	432,890	447,462	412,741	410,079
Mechanics[b]	277,436	288,335	298,028	274,100	284,241
Parachute Rigger[b]	9,893	10,074	10,194	9,395	9,535
Ground Instructor[b]	65,004	66,385	67,463	58,214	59,443
Dispatcher[b]	7,580	8,223	8,980	8,511	9,025
Flight Navigator	1,695	1,636	1,603	1,542	1,512
Flight Engineer	38,053	38,546	40,534	43,377	46,323
Flight Instructor Certificates[c]	62,492	62,201	61,173	58,940	57,355
Instrument Ratings[c]	255,073	254,271	256,584	258,559	262,388

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

[a] Glider and lighter-than-air pilots are not required to have a medical examination; however, the totals above are the pilots who received a medical.

[b] No periodic medical examination required; therefore, no determination as to current activity can be made.

[c] Special ratings shown on pilot certificates represented above, not additional certificates.

In 1986, there were 3,325 active heliports in the United States, according to the *1987 Helicopter Annual* published by Helicopter Association International (HAI). The HAI survey also embraced Puerto Rico, with 13

Helicopter Transportation

heliports, and the Virgin Islands, which have two. Thus, the total surveyed was 3,340.

Almost 95 percent of the helicopter landing areas in the United States, Puerto Rico and the Virgin Islands were private facilities, HAI noted, listing a breakdown that showed 3,158 private heliports/helipads and 182 public facilities. Only 97 heliports— 2.9 percent of the total—were located at airports. Hospital heliports numbered 937 (28.1 percent and there were 655 government facilities, 151 of them military.

Texas, with 374, led the 50 state is total number of heliports in operation during 1986. California was second with 319 and Pennsylvania ranked third with 227. Other states with a significant number of helicopter facilities were Illinois (187), Ohio (170), New Jersey (166), Florida (155), Louisiana (154), New York (113) and Colorado (103).

Comparison with prior years is not possible because *Aerospace Facts and Figures* is employing the HAI data for the first time. Not directly comparable, but perhaps useful as a rough comparative indicator, is the information in the formerly-used source, Aerospace Industries Association's *Directory of Heliports/Helistops in the United States, Canada and Puerto Rico.* The 1984 edition, the last published, listed 4,232 facilities, 4,020 in the 50 states, 65 in Puerto Rico and 147 in Canada. The publication showed 1,071 hospital heliports in 1984, 1,054 in the states, three in Puerto Rico and 14 in Canada.

The *1987 Helicopter Annual* also provided a breakdown of the 3,488 owners/operators of heliports/helipads in the United States, Puerto Rico and the Virgin Islands. The breakdown showed that corporate operators/owners represented the largest category, with 37.8 percent of all helicopter landing areas. Hospitals controlled 26.9 percent, government 18.6 percent, individuals 10.9 percent, oil companies 3.9 percent and hotels 1.9 percent. Numerically, corporate heliports/helipads totaled 1,319, hospital facilities 937, government 650, individuals 382, oil companies 135 and hotels 65.

Within the corporate category, the geographical breakdown was essentially the same as that for total heliports—Texas (201), California (146) and Pennsylvania (103) placing one-two-three. In the hospitals category, Illinois was the leading state with 84 facilities; Texas had 66 and California 65. California led by a very wide margin in the number of government facilities—104; Texas had 40, New Jersey 36. Among oil company operators, Louisiana—with 67—had almost half the total, while Texas was second with 38. No prior year direct comparison data is available for either the categories or the geographical breakdown.

Among government-sponsored development programs that are primarily military but offer potential for future civil application are the V-22 is scheduled for initial flight testing beginning in mid-1988. Being developed jointly by Bell Helicopter Textron and Boeing Vertol Company, the V-22 is based on the earlier NASA/Army/Navy X15 tilt rotor; NASA continued in 1987 to conduct tests of the XV-15 in support of the V-22 program and as a means of evaluating the potential of tilt rotor aircraft as future civil commuter transports.

The Sikorsky-built x-wing research plane, a joint program of NASA and the Defense Advanced Research Projects Agency, is a modified version of the NASA Rotor Systems Research Aircraft (RSRA) intended to demonstrate a concept that combines the maneuverability and hovering capabilities of the helicopter with the higher cruising speed of a fixed-wing airplane. It features a stiff, four-bladed rotor that can be stopped in flight and locked in place to become an x-shaped fixed wing for speeds approaching 500 miles per hour. In the spring of 1987, NASA initiated flight tests of the RSRA as a fixed-wing craft without the x-rotor. Ground taxi tests with the x-wing turning were planned for late 1987 and flight tests were targeted for 1988. The x-wing concept is seen to have potential as a short-haul civil transport around the turn of the century.

XV-15
TILTROTOR
N702NA

OPERATORS/OWNERS OF HELIPADS IN THE UNITED STATES, PUERTO RICO AND THE VIRGIN ISLANDS

By State
As of 1986

State	Corp.	Indiv.	Hotels	Oil	Govt.	Hospitals
Alaska	8	2	0	1	19	1
Alabama	12	4	0	0	10	14
Arkansas	0	1	0	0	3	10
Arizona	35	4	1	0	6	29
California	146	14	5	14	104	65
Colorado	37	5	2	2	25	36
Connecticut	40	2	1	0	3	3
District of Columbia	6	1	0	2	11	3
Delaware	10	2	0	0	0	0
Florida	55	2	4	0	25	49
Georgia	21	6	3	0	20	25
Hawaii	3	1	0	0	10	5
Iowa	4	3	1	0	4	27
Idaho	2	3	0	0	7	9
Illinois	51	23	1	0	29	84
Indiana	24	18	3	0	14	22
Kansas	3	1	0	0	5	12
Kentucky	8	3	1	0	3	11
Louisiana	98	4	3	67	20	31
Massachusetts	22	6	1	0	11	10
Maryland	13	7	1	0	9	16
Maine	4	0	0	0	2	2
Michigan	23	9	3	0	6	12
Minnesota	5	5	0	0	5	4
Missouri	10	11	3	0	10	38
Mississippi	1	3	0	0	7	7
Montana	0	2	0	0	3	9
North Carolina	10	3	0	0	17	19
North Dakota	1	2	0	0	1	1
Nebraska	3	4	0	0	2	10
Nevada	5	0	5	0	10	6
New Hampshire	8	1	0	0	1	0
New Jersey	84	24	5	4	36	14
New Mexico	3	2	0	0	4	5

(Continued on next page)

OPERATORS/OWNERS OF HELIPADS IN THE UNITED STATES, PUERTO RICO AND THE VIRGIN ISLANDS

By State
As of 1986

State	Corp.	Indiv.	Hotels	Oil	Govt.	Hospitals
New York	53	11	0	0	26	23
Ohio	56	26	4	1	35	50
Oklahoma	13	4	1	0	6	19
Oregon	25	11	1	0	6	29
Pennsylvania	103	38	7	4	25	54
Puerto Rico	10	0	0	0	3	1
Rhode Island	2	0	0	0	3	1
South Carolina	6	0	0	0	3	4
South Dakota	1	2	0	0	1	0
Tennessee	15	8	0	1	6	11
Texas	201	70	5	38	40	66
Utah	7	3	1	0	7	11
Virginia	23	4	0	0	25	31
Virgin Islands	0	0	0	0	2	0
Vermont	2	1	0	0	0	1
Washington	28	15	2	0	12	28
Wisconsin	5	7	0	0	4	7
West Virginia	10	3	1	0	1	8
Wyoming	4	1	0	1	3	4
Totals	1319	382	65	135	650	937

Source: Helicopter Association International, "1987 Helicopter Annual."

NOTE: Corporate operator/owners control 37.8 percent of all helicopter landing areas; hospitals control 26.9 percent; government 18.6 percent; individuals 10.9 percent; oil companies 3.9 percent; and hotels 1.9 percent.

HELIPORTS/HELIPADS[a] IN THE UNITED STATES, PUERTO RICO AND THE VIRGIN ISLANDS

By State
As of 1986

State	Total* of heliports in state	Private/ Public Heliports	Heliports at Airports/ Heliports	Hospital	Military/ Government
Alaska	30	20/10	7/23	1	1/19
Alabama	40	38/2	1/39	14	5/10
Arkansas	14	14/0	1/13	10	3/3
Arizona	76	75/1	2/74	29	1/6
California	319	296/23	21/298	65	10/104
Colorado	103	99/4	4/99	36	1/25
Connecticut	47	44/3	2/45	3	1/3
District of Columbia	19	17/2	2/17	3	4/11
Delaware	14	13/1	0/14	0	0/2
Florida	155	154/1	0/155	49	4/25
Georgia	73	72/1	1/72	25	6/20
Hawaii	18	14/4	3/15	5	1/10
Iowa	44	43/1	1/43	27	5/9
Idaho	19	19/0	0/19	9	1/7
Illinois	187	182/5	4/183	84	6/29
Indiana	83	78/5	4/79	22	3/5
Kansas	22	19/3	3/19	12	0/4
Kentucky	26	25/1	0/26	11	1/3
Louisiana	154	148/6	3/151	31	3/20
Massachusetts	53	49/4	2/51	10	8/11
Maryland	46	44/2	2/44	16	2/9
Maine	8	7/1	0/8	2	0/2
Michigan	51	49/2	1/50	12	0/6
Minnesota	19	17/2	3/16	4	0/5
Missouri	71	66/5	4/67	38	7/10
Mississippi	18	18/0	0/18	7	1/7
Montana	14	12/2	0/14	9	0/3
North Carolina	47	45/2	1/46	19	5/17
North Dakota	5	5/0	0/5	1	1/1
Nebraska	19	19/0	1/18	10	1/2
Nevada	26	25/1	0/26	6	1/10
New Hampshire	10	9/1	1/9	0	0/0
New Jersey	166	161/5	0/166	14	6/36
New Mexico	13	12/1	0/13	5	0/4

(Continued on next page)

HELIPORTS/HELIPADS[a] IN THE UNITED STATES, PUERTO RICO AND THE VIRGIN ISLAND'S (Continued)

By State
As of 1986

State	Total* of heliports in state	Private/ Public Heliports	Heliports at Airports/ Heliports	Hospital	Military/ Government
New York	113	102/11	2/111	23	7/26
Ohio	170	143/27	7/163	50	3/35
Oklahoma	43	39/4	0/43	19	1/6
Oregon	60	57/3	2/58	29	3/6
Pennsylvania	227	216/11	1/226	54	9/25
Puerto Rico	13	13/0	0/13	1	1/3
Rhode Island	6	5/1	0/6	1	1/3
South Carolina	13	13/0	0/13	4	3/3
South Dakota	4	4/0	0/4	0	1/1
Tennessee	40	37/3	2/38	11	2/6
Texas	374	364/10	2/372	66	7/40
Utah	28	26/2	2/26	11	2/7
Virginia	82	77/5	2/80	31	8/25
Virgin Islands	2	2/0	0/2	0	0/2
Vermont	13	12/1	0/13	1	9/9
Washington	86	84/2	2/84	28	5/12
Wisconsin	22	22/0	0/22	7	1/4
West Virginia	23	23/0	0/23	8	0/1
Wyoming	12	11/1	1/11	4	0/3
Total U.S. (50 States)	3325	3143/182	97/3228	936	150/650
Total U.S., Puerto Rico Virgin Islands	3340	3158/182	97/3243	937	151/655

Source: Helicopter Association International, "1987 Helicopter Annual".

NOTE: 94.6 percent of all U.S. helicopter landing areas are private, while 5.4 percent are public. 28.1 percent of all U.S. helicopter landing areas are at hospital. 97.1 percent are at heliports/helipads while 2.9 percent are at airports.

[a] Excludes temporary heliports, offshore heliports or infrequently used helicopter landing sites.

CIVIL HELICOPTER FLEET
UNITED STATES, CANADA, MEXICO AND PUERTO RICO

1985[P]

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
Alabama	34	12	16	6	91	38	23	30
Alaska	51	34	13	4	280	256	16	8
Arizona	60	34	19	7	183	139	22	22
Arkansas	16	9	6	1	42	34	7	1
California	277	140	96	41	846	495	170	181
Colorado	64	25	34	5	156	94	47	15
Connecticut	26	10	16	—	59	38	21	—
Delaware	6	—	5	1	6	—	5	1
Dist. of Col.	7	1	—	6	31	3	—	28
Florida	169	75	60	34	292	239	65	88
Georgia	39	13	14	12	99	47	17	35
Hawaii	24	20	3	1	56	52	3	1
Idaho	38	20	15	3	80	55	20	5
Illinois	46	21	19	6	115	67	29	19
Indiana	42	18	17	7	109	62	33	15
Iowa	18	8	5	5	35	15	6	14
Kansas	19	12	4	3	36	23	6	7
Kentucky	37	8	27	2	57	21	32	4
Louisiana	46	22	17	7	699	632	54	13
Maine	8	4	3	1	21	12	4	5
Maryland	17	8	7	2	61	39	7	15
Massachusetts	24	10	12	2	63	42	19	2
Michigan	41	18	18	5	87	44	23	20
Minnesota	27	19	7	1	62	51	8	3
Mississippi	11	2	5	4	19	8	5	6
Missouri	29	13	12	4	71	48	12	11
Montana	24	14	5	5	48	33	6	9
Nebraska	15	7	6	2	31	15	7	9
Nevada	16	7	5	4	40	22	12	6
New Hampshire	17	9	8	—	40	30	10	—
New Jersey	54	21	27	6	151	99	38	14
New Mexico	12	5	5	2	24	12	7	5

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CIVIL HELICOPTER FLEET
UNITED STATES, CANADA, MEXICO AND PUERTO RICO (Continued)
1985^{e}

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
New York	77	27	41	9	198	98	72	28
North Carolina	19	7	8	4	37	14	14	9
North Dakota	17	12	4	1	39	31	5	3
Ohio	72	30	37	5	116	71	37	8
Oklahoma	36	21	13	2	125	107	13	5
Oregon	76	40	35	1	322	271	45	6
Pennsylvania	100	35	64	1	238	126	105	7
Rhode Island	6	2	3	1	7	2	4	1
South Carolina	23	12	7	4	59	46	7	6
South Dakota	5	4	—	1	9	8	—	1
Tennessee	31	12	15	4	69	33	17	19
Texas	217	72	132	13	548	259	244	45
Utah	26	17	8	1	130	116	13	1
Vermont	4	1	3	—	5	2	3	—
Virginia	36	10	19	7	64	25	24	15
Washington	86	50	29	7	208	148	43	17
West Virginia	39	7	29	3	48	11	30	7
Wisconsin	12	10	2	—	51	49	2	—
Wyoming	19	12	7	—	37	29	8	—
Puerto Rico	6	1	2	3	11	2	2	7
U.S. Total	2,221	1,002	963	256	6,412	4,244	1,391	777
Canada	217	125	75	17	1,236	1,008	131	97
Mexico	43	9	13	21	256	18	30	208
TOTAL	2,481	1,136	1,051	294	7,904	5,270	1,552	1,082

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States,Canada, Mexico and Puerto Rico, 1985/86".

e Latest available data.

Funding of U.S. industrial research and development increased significantly in 1986, as it has throughout the 1980s. According to data from the National Science Foundation (NSF), combined outlays by all industries amounted

Research and Development

to $85.7 billion, roughly 9.6 percent higher than the previous year's $78.2 billion and 6.8 percent higher in inflation-adjusted constant dollars.

Industrial research and development embraces all; R&D performed in industry facilities, including both company-funded and government-funded work. It is not to be confused with *independent* research and development, known as IR&D; the latter is a company-funded technology advancement effort intended to improve a firm's competitive posture. Company-funded research and development (IR&D plus other types of company-sponsored research) accounted for almost 64 percent of the total industrial R&D in 1986; it amounted to $54.7 billion, compared with $31.0 billion in federal government funding.

The aerospace industry, perennial leader among U.S. industries, once again headed the list in industrial R&D outlays, according to a study by McGraw Hill Publications Company. Arriving at slightly lower estimates than those of the NSF, McGraw Hill showed total industrial R&D at $82.9 billion and the aerospace figure at 18.5 billion, or 22 percent of the total. In second place was the electrical machinery industry, with 1986 expenditures of $18.0 billion; non-electrical machinery was third at $11.2 billion.

McGraw Hill preliminary estimates for 1987 indicated that aerospace industrial R&D funding will increase by more than $1 billion and that the aerospace industry will retain its top ranking, again providing 22 percent of the total. All-industry outlays were estimated at $87.0

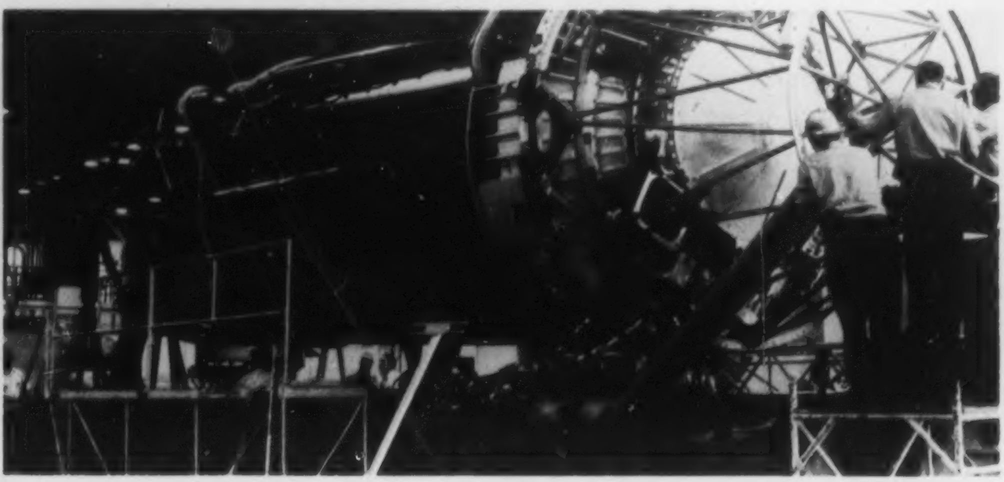
billion, aerospace at $19.6 billion. Electrical machinery ($18.5 billion) and non-electrical machinery ($11.1 billion) would retain their second and third place standings.

NSF data show that the aerospace industry exceeds the mean for all U.S. manufacturing industries when R&D funding is measured as a percentage of sales. In 1985, the latest year for which such information is available, aerospace company funding for R&D (exclusive of government contractual funding) amounted to 4.1 percent of net sales. This compared with an average for all manufacturing industries of 2.8 percent. For the five-year period 1981-85, aerospace company R&D outlays averaged 4.3 percent; the figure for all manufacturing industries was 2.6 percent. When company and government funds were combined, NSF found that the aerospace lead widened significantly. In 1985, combined aerospace outlays amounted to 17.5 percent of net sales, compared with the all manufacturing industry average of 4.2 percent. For the 1981-85 five-year span, aerospace averaged 16.9 percent, all industries 3.8 percent.

In 1986, total U. S. funding for R&D reached an all-time high of $116.8 billion, up from $107.5 billion in 1985. These figures include, in addition to the work performed by industry, R&D conducted by other organizations among government agencies, colleges and universities, federally-funded R&D centers, and non-profit institutions. Industry performed more than 73 percent of the nation's R&D, government agencies more than 11 percent, colleges and universities nine percent. For 1987, NSF expected total R&D expenditures to reach $124.3 billion, with industrially-performed work topping the $90 billion level.

The Department of Defense is perennially the largest source of R&D funding and outlays by the Air Force far exceed those of the other services, a DoD analysis showed. In Fiscal Year 1986, USAF outlays for research, development, test and evaluation amounted to $13.4 billion, compared with $9.7 billion for the Navy and $4 billion for the Army. For FY 1987, USAF outlays were estimated at $14.0 billion, the Navy's at $9.3 billion and the Army's at $4.5 billion. The analysis also provided estimates for FY 1988—USAF $16.1 billion, Navy $9.5 billion, Army $4.8 billion—but Congressional actions on the DoD budget, not fully resolved at publication time, suggested that the R&D allocations would be scaled down in a general DoD budget cut.

A geographical breakdown of DoD FY 1986 prime contract awards to industry, educational and other institutions showed the Pacific area again in first place with 32.5 percent of the total. Next, in order, were the Middle Atlantic region (14.2 percent), South Atlantic (13.1 percent) and New England (12.8 percent). The total value of contract awards was $19.4 billion, of which $16.8 billion (almost 90 percent) went to business firms.



FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

By Funding Source
Calendar Years 1972-1986
(Millions of Dollars)

Year	All Industries[a]			Aerospace Industry[b]		
	Total	Federal Funds	Company Funds[c]	Total	Federal Funds	Company Funds[c]
CURRENT DOLLARS						
1972	$19,552	$ 8,017	$11,535	$ 4,950	$ 3,970	$ 978
1973	21,249	8,145	13,104	5,052	3,899	1,154
1974	22,887	8,220	14,667	5,278	4,000	1,278
1975	24,187	8,605	15,582	5,713	4,428	1,285
1976	26,997	9,561	17,436	6,339	4,921	1,418
1977	29,825	10,485	19,340	7,033	5,486	1,547
1978	33,304	11,189	22,115	7,536	5,713	1,823
1979	38,226	12,518	25,708	8,041	5,840	2,201
1980	44,505	14,029	30,476	9,198	6,628	2,570
1981	51,810	16,382	35,428	11,968	8,528	3,440
1982	57,995	18,483	39,512	13,658	9,776	3,882
1983	63,403	20,542	42,861	13,853	10,405	3,448
1984[r]	71,470	23,162	48,308	16,033	12,228	3,804
1985	78,179	26,484	51,696	17,619	13,421	4,198
1986	85,660	30,936	54,724	20,272	15,521	4,751
CONSTANT DOLLARS (1982 = 100)[d]						
1972	$42,056	$17,244	$24,812	$10,645	$ 8,538	$2,103
1973	42,893	16,441	26,452	10,206	7,877	2,331
1974	42,415	15,234	27,181	9,774	7,407	2,367
1975	40,781	14,509	26,272	9,634	7,467	2,167
1976	42,805	15,159	27,646	10,046	7,799	2,247
1977	44,330	15,584	28,746	10,450	8,152	2,299
1978	46,115	15,493	30,622	10,438	7,913	2,525
1979	48,652	15,932	32,720	10,230	7,430	2,800
1980	51,919	16,366	35,553	10,733	7,734	2,999
1981	55,140	17,435	37,705	12,732	9,072	3,660
1982	57,995	18,483	39,512	13,658	9,776	3,882
1983	61,047	19,779	41,268	13,346	10,024	3,322
1984[r]	66,342	21,500	44,842	14,883	11,351	3,531
1985	70,324	23,823	46,502	15,849	12,073	3,776
1986	75,107	27,125	47,982	17,775	13,609	4,166

Source: National Science Foundation, for historical data and All Industries estimates; McGraw-Hill Publications Company for Aerospace Industry Total estimates; AIA for Aerospace Industry Federal/Company estimates. The McGraw-Hill estimates for All Industries are $82,887 million for 1986 and $86,978 million for 1987.

NOTE: Detail may not add to totals because of rounding.

[a] Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

[b] Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

[c] Company funds include all funds for industrial R&D work performed within company facilities except funds provided by the Federal Government. Excluded are company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

[d] Based on GNP implicit price deflator.

[r] Revised.

TOTAL U.S. FUNDS FOR RESEARCH AND DEVELOPMENT BY SOURCE AND PERFORMER[a]

Calendar Years 1984-1987
(Millions of Current Dollars)

Source of Funds	Total All Performers	Performer				
		Federal Government	Industry	Colleges & Universities	Federally-Funded Research & Development Centers	Nonprofit Institutions
1984						
All Sources—TOTAL	$ 97,639	$11,572	$71,470	$8,503	$3,118	$2,975
Federal Government	45,341	11,572	23,162	5,388	3,118	2,100
Industry	49,066	—	48,308	458	—	300
Colleges & Universities	2,024	—	—	2,024	—	—
Nonprofit Institutions	1,208	—	—	633	—	575
1985[p]						
All Sources—TOTAL	$107,462	$12,998	$78,179	$9,504	$3,529	$3,250
Federal Government	51,330	12,998	26,484	6,003	3,529	2,315
Industry	52,569	—	51,696	538	—	335
Colleges & Universities	2,259	—	—	2,259	—	—
Nonprofit Institutions	1,304	—	—	704	—	600
1986[E]						
All Sources—TOTAL	$116,793	$13,533	$85,660	$10,660	$3,600	$3,400
Federal Government	57,219	13,533	30,936	6,750	3,600	2,400
Industry	55,699	—	54,724	600	—	375
Colleges & Universities	2,500	—	—	2,500	—	—
Nonprofit Institutions	1,375	—	—	750	—	625
1987[E]						
All Sources—TOTAL	$124,250	$15,000	$90,700	$11,150	$3,800	$3,600
Federal Government	61,350	15,000	33,000	7,000	3,800	2,550
Industry	58,770	—	57,700	670	—	400
Colleges & Universities	2,700	—	—	2,700	—	—
Nonprofit Institutions	1,430	—	—	780	—	650

Source: National Science Foundation.
a Source/performer detail not available by industry.
p Preliminary.
E Estimate.

FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT[a] BY INDUSTRY

Calendar Years 1985-1987
(Millions of Dollars)

Industry	Current Dollars[a]			Constant Dollars[b]		
	1985	1986[E]	1987[p]	1985	1986[E]	1987[p]
ALL BUSINESS	$78,217	$82,887	$86,978	$70,150	$72,327	$73,461
ALL MANUFACTURING	75,350	79,819	83,608	67,578	69,650	70,615
Aerospace	$17,466	$18,549	$19,624	$15,665	$16,186	$16,574
Electrical Machinery	17,081	17,950	18,467	15,319	15,663	15,597
Non-Electrical Machinery	10,870	11,177	11,142	9,749	9,753	9,410
Chemicals	8,674	8,846	9,289	7,779	7,719	7,845
Autos, Trucks & Parts	7,058	8,062	8,626	6,330	7,035	7,285
Instruments	5,420	5,835	6,203	4,861	5,092	5,239
Petroleum	2,185	2,200	2,537	1,960	1,920	2,143
Rubber & Plastics	1,187	1,295	1,440	1,065	1,130	1,216
Food & Beverage	820	922	990	735	805	836
Paper & Pulp	863	857	912	774	748	770
Fabricated Metals	697	742	797	625	647	673
Iron & Steel	605	643	670	543	561	566
Stone, Clay & Glass	587	668	675	526	583	570
Nonferrous Metals	585	654	667	525	571	563
Lumber & Furniture	172	254	271	154	222	229
Textiles	158	167	170	142	146	144
Other Manufacturing	922	998	1,128	827	871	953

Source: McGraw-Hill Publications Company.

[a] McGraw-Hill data, based on 1985 preliminary figures from the National Science Foundation plus estimates from the McGraw-Hill annual spring survey of plans for business R&D spending.

[b] Based on GNP implicit price deflator, 1982 = 100. Detail may not add to totals because of rounding.

[p] Planned.

[E] Estimate.

RESEARCH AND DEVELOPMENT FUNDS AS PERCENT OF NET SALES ALL MANUFACTURING INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1971-1985

Year	All Manufacturing Industries[a]		Aerospace Industry[b]	
	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales
1980	3.0	2.1	13.7	3.8
1981	3.1	2.2	16.0	4.6
1982	3.8	2.6	17.7	5.0
1983	3.9	2.6	16.2	4.0
1984[r]	3.8	2.6	16.9	4.0
1985	4.2	2.8	17.5	4.1

Source: National Science Foundation.

[a] Includes all manufacturing industries known to conduct or finance research and development.

[b] Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

[r] Revised.

FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT IN THE AEROSPACE INDUSTRY

By Type of Research and Funding Source

Calendar Years 1962-1984[a]
(Millions of Dollars)

Year	TOTAL AERO-SPACE	Basic Research			Applied Research			Development		
		Total	Federal Funds	Company Funds	Total	Federal Funds	Company Funds	Total	Federal Funds	Company Funds
1962	$ 4,042	$ 54	$28	$26	$ 789	$664	$125	$ 3,198	$2,897	$ 301
1963	4,712	59	31	28	735	585	150	3,917	3,634	283
1964	5,078	67	34	34	766	607	159	4,244	3,948	296
1965	5,148	71	41	30	735	563	172	4,342	3,921	421
1966	5,526	69	36	33	773	563	210	4,685	4,162	523
1967	5,669	71	33	38	726	490	236	4,871	4,071	800
1968	5,765	68	26	42	677	426	251	5,021	4,145	876
1969	5,882	65	24	41	597	347	250	5,220	4,216	1,004
1970	5,219	63	20	43	565	352	213	4,591	3,718	873
1971	4,881	54	37	17	461	279	182	4,365	3,583	782
1972	4,950	60	44	16	451	267	184	4,438	3,722	716
1973	5,052	50	21	29	512	308	204	4,491	3,633	858
1974	5,278	51	19	32	609	360	249	4,617	3,735	882
1975	5,713	54	17	37	614	381	233	5,044	4,119	925
1976	6,339	54	21	33	666	365	301	5,619	4,521	1,098
1977[a]	7,033	56	25	31	753	419	334	6,223	5,017	1,206
1979	8,041	86	44	42	880	499	381	7,076	5,314	1,762
1981	11,968	131	60	71	1,484	897	587	10,353	7,738	2,615
1983[r]	13,853	146	NA	NA	3,466	NA	NA	10,241	7,668	2,573
1984	16,033	247	NA	NA	3,067	NA	NA	12,718	9,870	2,848

Source: National Science Foundation, plus estimates by AIA to adjust originally-published breakouts by Research Type and Funding Source to NSF's revised totals.
NOTE: Detail may not add to totals because of rounding.
a Break-outs by Research Type and Funding Source available only for odd-numbered years after 1977.
NA Not available.
r Revised.

FEDERAL AERONAUTICS RESEARCH AND DEVELOPMENT

Fiscal Years 1969-1987
(Millions of Dollars)

Year	TOTAL	NASA[a]	DOD[b]	DOT[c]
BUDGET AUTHORITY				
1969	$1,300	$169	$1,161	$(30)[d]
1970	1,882	199	1,641	42
1971	1,990	210	1,707	73
1972	2,295	236	1,964	95
1973	2,187	313	1,799	75
1974	2,030	278	1,678	74
1975	2,015	314	1,627	74
1976	2,351	325	1,941	85
Tr. Qtr.	584	83	480	22
1977	2,727	378	2,256	93
1978	3,338	437	2,807	94
1979	2,850	519	2,240	91
1980	2,991	560	2,336	95
1981	3,286	526	2,653	106
1982	3,581	516	2,984	81
1983	3,871	547	3,221	103
1984	4,087	600	3,224	263
1985	4,355	648	3,422	265
1986[E]	4,913	606	4,125	182
1987[E]	5,398	706	4,557	135
OUTLAYS				
1982[f]	$3,309	$563	$2,657	$89
1983	3,554	563	2,920	71
1984	3,727	586	2,995	146
1985	4,010	643	3,101	266
1986[E]	4,283	609	3,412	263
1987[E]	4,642	652	3,812	178

Source: NASA, "Aeronautics and Space Report of the President" (Annually).

[a] Research and Development, Construction of Facilities, Research and Program Management.

[b] Research, Development, Testing and Evaluation of aircraft and related equipment.

[c] Federal Aviation Administration Research, Engineering and Development, and Facilities, Engineering and Development.

[d] Unobligated balances for SST research and development, rescinded in 1969.

[E] Estimate. Latest year reflects Administration's budget proposal.

[f] First year outlays data available.

FEDERAL OUTLAYS FOR CONDUCT OF RESEARCH AND DEVELOPMENT

Fiscal Years 1974-1988
(Millions of Dollars)

Year	TOTAL	DOD	NASA	Energy[a]	Other
CURRENT DOLLARS					
1974	$18,239	$ 8,956	$3,256	$1,825	$ 4,202
1975	19,525	9,341	3,266	2,277	4,641
1976	20,233	9,329	3,521	2,225	5,158
1977	22,462	10,176	3,763	3,181	5,342
1978	24,532	10,726	3,833	3,925	6,048
1979	26,578	11,454	4,064	4,413	6,648
1980	30,351	13,451	4,711	4,698	7,492
1981	34,252	15,720	5,279	5,121	8,132
1982	34,509	18,201	3,220	4,974	8,114
1983	36,560	21,057	2,538	4,771	8,193
1984	40,518	23,583	3,539	4,702	8,694
1985	45,244	27,878	2,970	4,900	9,496
1986	51,576	33,292	3,432	4,705	10,147
1987[E]	54,548	35,153	3,711	4,819	10,865
1988[E]	59,108	39,112	4,159	4,863	10,974
CONSTANT DOLLARS (1982 = 100)[b]					
1974	$34,967	$17,170	$6,242	$3,499	$ 8,056
1975	33,945	16,240	5,678	3,959	8,068
1976	32,592	15,027	5,672	3,584	8,309
1977	33,510	15,181	5,614	4,746	7,970
1978	34,205	14,955	5,344	5,473	8,433
1979	34,118	14,703	5,217	5,665	8,534
1980	35,817	15,873	5,559	5,544	8,841
1981	36,743	16,863	5,663	5,493	8,723
1982	34,509	18,201	3,220	4,974	8,114
1983	35,070	20,199	2,435	4,576	7,859
1984	37,385	21,760	3,265	4,338	8,022
1985	40,393	24,889	2,652	4,375	8,478
1986	44,736	28,877	2,977	4,081	8,801
1987[E]	45,885	29,570	3,122	4,054	9,139
1988[E]	48,024	31,778	3,379	3,951	8,916

Source: "The Budget of the United States Government, Special Analyses, (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] Energy research and development programs transferred from AEC to ERDA with 1974 reorganization and to Dept. of Energy in 1977.

[b] Based on Fiscal Year GNP implicit price deflator.

[E] Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE APPROPRIATIONS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1986-1988
(Millions of Dollars)

	1986	1987^{E}	1988^{E}
TOTAL—APPROPRIATIONS FOR RDT&E	$33,676	$36,946	$43,719
BY APPROPRIATION			
Army	$ 4,577	$ 4,755	$ 5,511
Navy	9,521	9,382	10,490
Air Force	13,161	15,417	18,623
Defense Agencies	6,303	7,185	8,812
Director of Test & Evaluation, Defense	114	150	178
Director of Test & Evaluation, Defense	—	57	104
BY RESEARCH CATEGORIES			
Research	$ 954	$ 892	$ 918
Exploratory Development	2,279	2,342	2,503
Advanced Development	9,472	10,938	14,602
Engineering Development	9,215	10,115	13,112
Management and Support	2,689	2,783	2,711
Operational Systems Development	9,067	9,877	9,873
RECAP OF BUDGET ACTIVITIES			
Technology Base	$ 3,232	$ 3,233	$ 3,421
Advanced Technology Development	4,067	5,430	7,163
Strategic Programs	7,509	8,125	9,990
Tactical Programs	10,266	11,022	13,727
Intelligence and Communications	4,525	4,923	5,262
Defensewide Mission Support	4,077	4,213	4,156
RECAP OF FYDP PROGRAMS			
Strategic Forces	$ 1,006	$ 1,147	$ 932
General Purpose Forces	1,891	2,162	2,224
Intelligence and Communications	5,879	6,277	6,268
Airlift/Sealift	78	103	144
Guard and Reserve	—	36	63
Research and Development (FYDP Program 6)	24,609	27,069	33,846
Central Supply and Maintenance	203	143	237
Training, Medical and Other	5	4	—
Support of Other Nations	4	4	4

Source: Department of Defense Budget, "R,D,T&E Programs (R-1)" (Annually).
NOTE Detail may not add to totals because of rounding.
E Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE
OUTLAYS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1971-1989
(Millions of Dollars)

Year	TOTAL, All RDT&E Functions	Air Force	Navy	Army	Other
1971	$ 7,303	$ 2,809	$2,405	$1,569	$ 520
1972	7,881	3,205	2,427	1,779	470
1973	8,157	3,362	2,404	1,912	479
1974	8,582	3,240	2,623	2,190	529
1975	8,866	3,308	3,021	1,964	573
1976	8,923	3,338	3,215	1,842	528
Tr. Qtr.	2,203	830	778	437	161
1977	9,795	3,618	3,481	2,069	627
1978	10,508	3,626	3,825	2,342	715
1979	11,152	4,080	3,826	2,409	837
1980	13,127	5,017	4,382	2,707	1,021
1981	15,278	6,341	4,783	2,958	1,196
1982	17,729	7,794	5,240	3,230	1,465
1983	20,554	9,182	5,854	3,658	1,861
1984	23,117	10,353	6,662	3,812	2,289
1985	27,103	11,573	8,054	3,950	3,526
1986	32,283	13,417	9,667	3,984	5,215
1987[E]	34,178	13,991	9,282	4,521	6,384
1988[E]	38,266	16,114	9,523	4,841	7,788
1989[E]	42,095	17,245	9,920	5,482	9,448

Source: Department of Defense Budget (Annually).

[E] Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE PRIME CONTRACT AWARDS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1982-1986
(Millions of Dollars)

Program Categories	1982	1983	1984	1985	1986
TOTAL—RDT&E	$14,882	$16,301	$18,277	$18,938	$19,812
Research	685	763	957	1,142	1,664
Exploratory Development	1,285	1,261	1,246	1,716	1,494
Other Development	12,537	13,915	15,616	15,432	15,870
Management & Support	375	362	459	648	784
Aircraft—TOTAL	$ 2,906	$ 2,072	$ 2,316	$ 2,304	$ 3,160
Research	14	36	95	130	591
Exploratory Development	139	152	142	139	106
Other Development	2,740	1,879	2,074	2,025	2,449
Management & Support	13	6	4	9	14
Missile and Space Systems—TOTAL	5,648	6,444	7,296	7,119	6,873
Research	14	34	14	23	22
Exploratory Development	322	239	224	385	325
Other Development	5,265	6,097	6,937	6,583	6,401
Management & Support	48	73	120	127	125
Electronics & Communications Equipment—TOTAL	3,534	4,681	4,644	4,718	4,515
Research	77	76	95	126	122
Exploratory Development	351	404	397	394	325
Other Development	3,049	4,127	4,042	4,083	3,983
Management & Support	57	75	111	115	86
All Other—TOTAL[a]	2,794	3,104	4,021	4,797	5,264
Research	581	617	753	863	930
Exploratory Development	473	466	483	798	738
Other Development	1,482	1,812	2,561	2,741	3,037
Management & Support	257	208	224	397	559

Source: Department of Defense, "Prime Contract Awards by Service Category and Federal Supply Classification" (Annually).
NOTE: Detail may not add to totals because of rounding.
[a] "All Other" includes ships, tank-automative, weapons, ammunition, services, and other.

DEPARTMENT OF DEFENSE
NET VALUE OF PRIME CONTRACT AWARDS OVER $25,000[a] FOR RESEARCH, DEVELOPMENT, TEST & EVALUATION

By Region and Type of Contractor
Fiscal Year 1986

REGION	TOTAL	Type of Contractor		
		Educational Institutions	Other Non-Profit Institutions[a]	Business Firms
TOTAL—Millions of Dollars	$19,433	$1,408	$1,195	$16,830
New England	$ 2,491	$ 428	$ 534	$ 1,529
Middle Atlantic	2,763	146	41	2,576
East North Central	804	70	86	648
West North Central	889	13	3	873
South Atlantic	2,544	412	112	2,020
East South Central	416	14	5	396
West South Central	1,361	62	12	1,287
Mountain	1,842	82	1	1,759
Pacific[b]	6,324	182	401	5,741
PERCENT OF TOTAL	100.0%	100.0%	100.0%	100.0%
New England	12.8%	30.4%	44.7%	9.1%
Middle Atlantic	14.2	10.3	3.4	15.3
East North Central	4.1	5.0	7.2	3.9
West North Central	4.6	0.9	0.3	5.2
South Atlantic	13.1	29.2	9.4	12.0
East South Central	2.1	1.0	0.4	2.4
West South Central	7.0	4.4	1.0	7.6
Mountain	9.5	5.8	0.1	10.5
Pacific[b]	32.5	12.9	33.6	34.1

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] Includes contracts with other government agencies.

[b] Includes Alaska and Hawaii.

MISSILE PROGRAMS
RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1987, 1988 and 1989
(Millions of Dollars)

Agency, Type and Model	1987[E]	1988[E]	1989[E]
AIR FORCE			
ALCM	$ 4.8	$ 3.6	$ 1.0
AMRAAM[b]	37.2	28.2	—
*ASMS	145.0	134.2	152.0
GLCM	—	5.3	1.0
Peacekeeper (M-X)	378.7	618.8	1,275.1
Small ICBM in Hard Mobile Basing	1,168.7	2,257.0	2,186.6
*SRAM II	66.5	220.4	231.6
NAVY			
Harm[b]	$ 19.0	$ 13.6	$ 12.5
Harpoon	19.0	32.6	17.0
Hawk[e]	2.5	1.7	1.9
22R Maverick[b]	—	0.5	—
RAM	23.2	14.2	10.0
Sidewinder[b]	21.4	21.9	23.0
Standard	77.4	116.5	147.2
Tomahawk	59.4	47.4	46.7
Trident II	1,589.0	1,090.8	574.1
VLA	39.8	18.5	5.7
ARMY			
*Advanced Anti-Tank Weapon System	$ 46.9	$ 59.1	$ 231.6
ATACMS	84.8	112.2	86.6
Chaparral	5.4	1.5	—
Laser Hellfire[c]	7.2	24.4	10.8
Patriot	24.0	27.0	34.1
PMS Stinger	3.3	4.8	—
TOW 2[d]	4.8	18.9	14.7

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE: Actual data for FY 1986 unavailable. See Missile Programs Chapter for missile program procurement authorization data

E Estimate. Latest year reflects Administration's budget proposal.
a Total Obligational Authority.
b Navy and Air Force funding.
c Army and Navy funding.
d Army and Marine Corps funding.
e Marine Corps funding.
g Navy and Marine Corps funding.
* Programs in R&D only.

MILITARY AIRCRAFT PROGRAMS RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1987, 1988 and 1989
(Millions of Dollars)

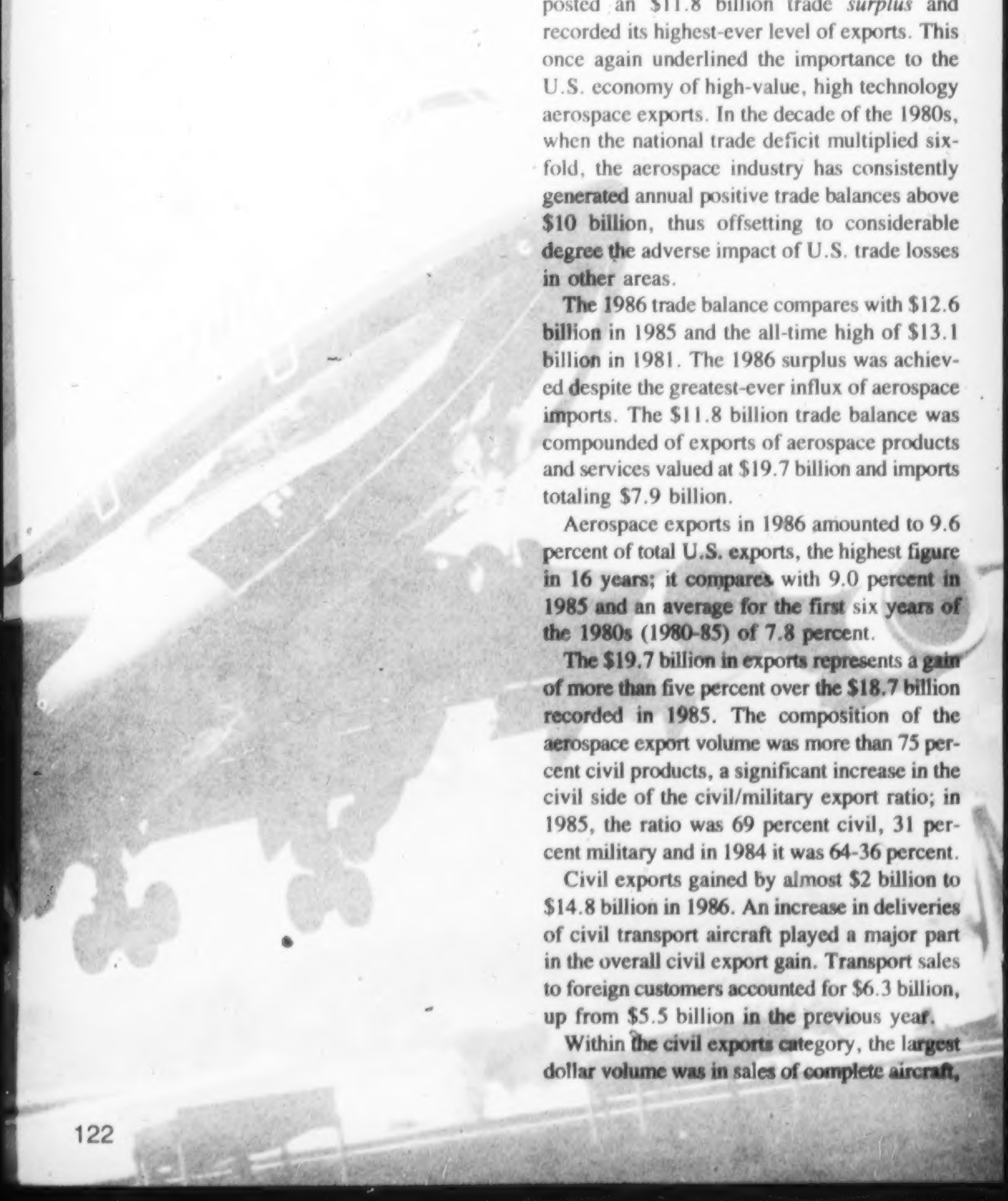
Agency, Type and Model	1987[E]	1988[E]	1989[E]
AIR FORCE			
*Advanced Tactical Fighter	$248.8	$ 536.8	$703.0
*Aircraft Engine Component Improvement Program[b]	152.1	136.5	166.1
C-17	626.3	1,219.9	982.0
F-15 C/D/E	156.1	118.6	69.3
F-16 Multimission Fighter (Falcon)	54.9	36.5	23.6
KC-135 Re-engining/modern	3.7	4.0	4.2
LANTIRN (Night Precision Attack)	38.8	19.9	4.7
MC-130H Combat Talon[b]	18.5	8.6	—
TR-1/U-2	20.5	74.9	102.3
VC-X (Air Force One Replacement)	8.8	12.7	0.2
NAVY			
A-6E/F Intruder	$171.0	$ 124.0	$ 78.1
AH-1W Sea Cobra	—	11.2	12.6
AV-8B	44.5	13.1	11.4
CH/MH-53E Super Stallion	1.6	15.3	9.2
E-2C Hawkeye	33.0	33.4	25.1
E-6A	76.4	36.2	—
EA-6B Prowler	50.1	54.6	26.5
F-14 A/D Tomcat	264.0	184.8	143.9
F/A-18 Hornet	31.7	17.3	19.9
*Joint Services Adv. Vert. Lift Aircraft (V-22)[b]	424.6	498.4	331.9
P-3C/G Orion	54.4	126.9	152.4
SH-60B Seahawk (LAMPS MK-III)	18.9	16.9	6.2
SH-60F CV ASW	4.0	0.6	—
T-45 Training System	129.2	96.0	87.8
ARMY			
AH-64 Attack Helicopter	$ —	$ 18.4	$ 4.8
LHX Army Helicopter	142.9	408.0	616.0
RPVs	61.8	32.6	29.6

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE: Actual data for FY 1986 unavailable. See Aircraft Production Chapter for aircraft program procurement authorization data.

[a] Total Obligational Authority.
[b] Air Force and Navy funding.
[c] Air Force, Navy and Marine Corps funding.
[d] Army, Navy and Air Force funding.
[E] Estimate. Latest year reflects Administration's budget proposal.
* Programs in R&D only.

In 1986, the United States experienced a merchandise trade deficit of $162.3 billion, the 11th consecutive international trade deficit and the worst in the nation's history.

Foreign Trade



In the same year, the U.S. aerospace industry posted an $11.8 billion trade *surplus* and recorded its highest-ever level of exports. This once again underlined the importance to the U.S. economy of high-value, high technology aerospace exports. In the decade of the 1980s, when the national trade deficit multiplied six-fold, the aerospace industry has consistently generated annual positive trade balances above $10 billion, thus offsetting to considerable degree the adverse impact of U.S. trade losses in other areas.

The 1986 trade balance compares with $12.6 billion in 1985 and the all-time high of $13.1 billion in 1981. The 1986 surplus was achieved despite the greatest-ever influx of aerospace imports. The $11.8 billion trade balance was compounded of exports of aerospace products and services valued at $19.7 billion and imports totaling $7.9 billion.

Aerospace exports in 1986 amounted to 9.6 percent of total U.S. exports, the highest figure in 16 years; it compares with 9.0 percent in 1985 and an average for the first six years of the 1980s (1980-85) of 7.8 percent.

The $19.7 billion in exports represents a gain of more than five percent over the $18.7 billion recorded in 1985. The composition of the aerospace export volume was more than 75 percent civil products, a significant increase in the civil side of the civil/military export ratio; in 1985, the ratio was 69 percent civil, 31 percent military and in 1984 it was 64-36 percent.

Civil exports gained by almost $2 billion to $14.8 billion in 1986. An increase in deliveries of civil transport aircraft played a major part in the overall civil export gain. Transport sales to foreign customers accounted for $6.3 billion, up from $5.5 billion in the previous year.

Within the civil exports category, the largest dollar volume was in sales of complete aircraft, which totaled $7.4 billion, compared with $6.7 billion in the previous year. Sales of aircraft and engine parts amounted to $6.5 billion (up from $5.3 billion) and sales of aircraft engines, at $987 million, were up $64 million.

Export sales of general aviation aircraft, in sharp decline for several years, rallied moderately to $243 million, a gain of $52 million. Exports of civil helicopters increased by $67 million to $277 million.

At $4.9 billion, military exports reached their lowest level in five years, down sharply from the $5.8 billion posted in 1985. The decline was across the board. Exports of complete aircraft fell from $2 billion in 1985 to $1.5 billion in 1986; aircraft and engine parts sales totaled $2.6 billion (down from $2.8 billion); exports of missiles and rockets amounted to $657 million (down $168 million) and deliveries abroad of aircraft engines for military use were valued at $111 million.

Aerospace imports reached a new record level for the third straight year; the $7.9 billion total compares with $6.1 billion in 1985 and $4.9 billion in 1984. Most of the gain was in civil imports, which rose from $5.0 billion in 1985 to $6.4 billion in 1986. Military imports, mostly aircraft and engine parts, totaled $1.5 billion, up from $1.1 billion in the previous year.

Within the civil imports category, there were gains in each of the three main subdivisions: complete aircraft, up $500 million to $2 billion; aircraft and engine parts, up $700 million to $3.2 billion; and aircraft engines, up $100 million to $1.1 billion.

A significant part of the increase in import sales of complete aircraft was in multi-engine commercial transports above 33,000 pounds; foreign manufacturers delivered 36 such transports worth $742 million; that compares with 1985 sales of 29 aircraft valued at $600 million. General aviation imports increased even more dramatically, from $673 million in 1985 to more than $1 billion in 1986. Helicopter imports were up $18 million to $63 million, the first increase after several years of decline.

The principal country of origin for aerospace imports was France, which sold $2 billion worth of products in the U.S. Other import producers were Canada ($1.9 billion) and the United Kingdom (1.9 billion).

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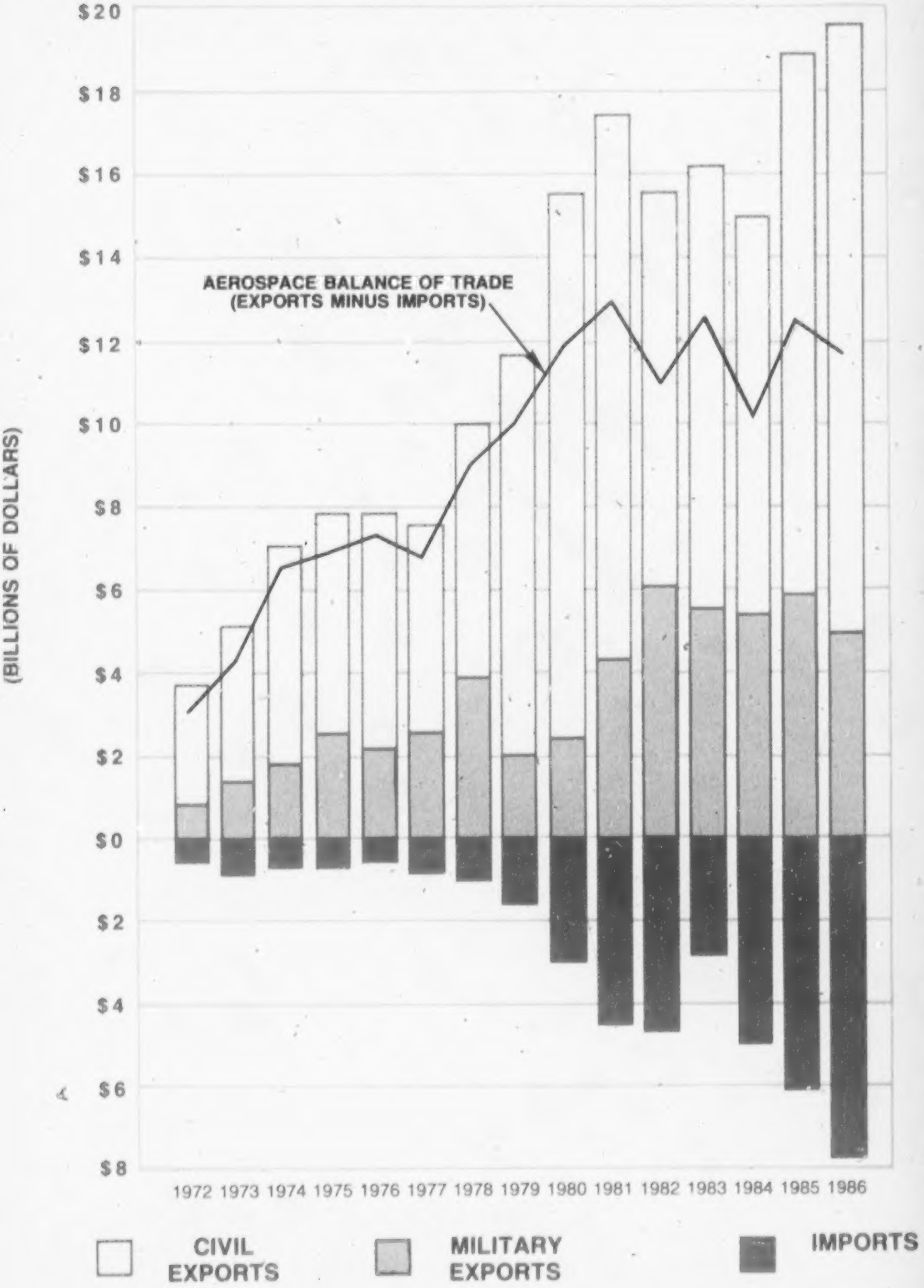
AEROSPACE EXPORTS, IMPORTS AND TRADE BALANCE



Source: Aerospace Industries Association

U.S. TOTAL AND AEROSPACE FOREIGN TRADE[a]

Calendar Years 1962-1986
(Millions of Dollars)

Year	Total U.S. Merchandise Trade			Aerospace		
	Trade Balance	Exports	Imports	Trade Balance	Exports	Imports
1962	$ 4,180	$ 20,431	$ 16,251	$ 1,795	$ 1,923	$ 128
1963	6,061	23,062	17,001	1,532	1,627	95
1964	7,555	26,156	18,601	1,518	1,608	90
1965	5,875	27,127	21,252	1,459	1,618	159
1966	4.524	29,884	25,360	1,370	1,673	303
1967	4,409	31,142	26,733	1,961	2,248	287
1968	1,133	34,199	33,066	2,661	2,994	333
1969	1,599	37,462	35,863	2,831	3,138	307
1970	2,834	42,590	39,756	3,097	3,405	308
1971	(2,024)[b]	43,492	45,516	3,830	4,203	373
1972	(6,351)	48,959	55,310	3,230	3,795	565
1973	1,222	70,246	69,024	4,360	5,142	782
1974	(2,996)	97,144	100,140	6,350	7,095	745
1975	9,630	106,561	96,931	7,045	7,792	747
1976	(7,786)	113,666	121,452	7,267	7,843	576
1977	(28,970)	119,006	147,976	6,850	7,581	731
1978	(33,541)	141,228	174,769	9,058	10,001	943
1979	(30,272)	178,798	209,070	10,123	11,747	1,624
1980	(27,336)	216,672	244,008	11,952	15,506	3,554
1981	(30,051)	228,961	259,012	13,134	17,634	4,500
1982	(35,182)	207,158	242,340	11,035	15,603	4,568
1983	(60,710)	195,969	256,679	12,619	16,065	3,446
1984	(110,932)	212,057	322,989	10,082	15,008	4,926
1985	(136,627)	206,925	343,552	12,592	18,724	6,132
1986	(162,281)	206,376	368,657	11,826	19,728	7,902

Source: Bureau of the Census, "Highlights of U.S. Export and Import Trade," Report FT990 (Monthly); "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually); "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

[a] Total U.S. and aerospace foreign trade are reported as (1) exports of domestic merchandise, including Department of Defense shipments, f.a.s. (= free alongside ship) basis, not seasonally adjusted, (2) imports for consumption, customs value basis, not seasonally adjusted, and (3) the difference (surplus or deficit) between exports and imports.

[b] First U.S. trade deficit since 1888.

U.S. EXPORTS OF AEROSPACE PRODUCTS[a] BY MAJOR COUNTRIES OF DESTINATION

Calendar Years 1982-1986
(Millions of Dollars)

Major Countries of Destination	1982	1983	1984	1985	1986
Australia	$ 312	$ 390	$ 445	$1,034	$1,327
Belgium/Luxembourg	213	281	247	216	345
Brazil	190	280	154	407	451
Canada	909	1,014	1,121	964	1,005
China	22	267	128	678	334
France	1,182	1,190	1,011	1,014	1,480
Germany, West	910	594	651	967	1,282
Israel	237	430	444	333	304
Italy	253	323	469	725	533
Japan	1,094	1,540	1,305	1,792	2,209
Korea, South	275	274	382	536	301
Netherlands	302	401	331	217	625
Saudi Arabia	525	380	419	687	670
Singapore	178	549	691	641	529
Sweden	93	98	156	463	419
Taiwan	391	266	264	358	238
United Kingdom	736	1,087	1,276	1,566	1,301

Source: U.S. Department of Commerce, International Trade Administration.

[a] Includes all civil products, f.a.s. basis; excludes military products, which are not reported by country of destination.

U.S. IMPORTS OF AEROSPACE PRODUCTS[a] BY MAJOR COUNTRIES OF ORIGIN

Calendar Years 1982-1986
(Millions of Dollars)

Major Countries of Origin	1982	1983	1984	1985	1986
Canada	$1,200	$1,018	$1,397	$1,552	$1,905
France	827	726	1,109	1,673	2,007
Germany, West	97	124	121	229	315
Israel	126	73	142	132	211
Italy	124	113	143	138	221
Japan	200	177	173	185	272
Netherlands	109	49	124	219	275
Singapore	30	36	100	114	121
Sweden	10	10	33	183	244
United Kingdom	1,122	933	1,163	1,562	1,898

Source: U.S. Department of Commerce, International Trade Administration.

[a] Includes civil and military products, c.i.f. basis.

U.S. IMPORTS OF AEROSPACE PRODUCTS

Calendar Years 1982-1986
(Millions of Dollars)

Aerospace Imports	1982	1983	1984	1985	1986
TOTAL	$4,568	$3,446	$4,926	$6,132	$7,902
TOTAL CIVIL	$3,875	$2,927	$3,787	$4,984	$6,398
Complete Aircraft—TOTAL	$1,599	$ 924	$1,301	$1,502	$2,050
Transports	231	188	270	599	742
General Aviation	838	542	612	673	1,053
Helicopters	85	90	51	45	63
Other, Including Used Aircraft, & Gliders, Balloons, & Airships	445	104	368	185	192
Aircraft Engines—TOTAL	797	617	750	1,019	1,133
Turbine Engines	787	602	738	1,011	1,114
Piston Engines	10	15	12	8	19
Aircraft and Engine Parts— TOTAL	1,479	1,386	1,736	2,463	3,215
Aircraft Parts and Accessories	301	267	320	381	594
Turbine Engine Parts	454	452	561	851	1,053
Piston Engine Parts	4	5	6	14	12
Spacecraft Parts, & Other Parts & Accessories	720	662	849	1,217	1,556
TOTAL MILITARY	$ 692	$ 519	$1,139	$1,148	$1,504
Complete Aircraft—TOTAL	$ 28	$ 3	$ 14	$ 20	$ 35
Aircraft Engines—TOTAL	16	4	124	217	286
Turbine Engines	16	3	123	215	283
Piston Engines Including Parts	(*a*)	1	1	2	3
Aircraft and Engine Parts— TOTAL	648	512	1,001	911	1,183
Aircraft Parts	575	442	632	493	690
Turbine Engine Parts	47	52	163	228	317
Other Parts & Accessories	26	18	206	190	176

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).
NOTE: Detail may not add to totals because of rounding.
a Less than $500,000.

U.S. IMPORTS OF COMPLETE AIRCRAFT

Calendar Years 1982-1986

Aircraft Imports	1982	1983	1984	1985	1986
TOTAL NUMBER OF AIRCRAFT	872	693	995	1,241	797
Civil Aircraft—TOTAL	852	679	951	1,166	742
New Complete Aircraft:					
Helicopters	184	100	61	60	87
General Aviation:					
Single-Engine	23	6	21	46	71
Multi-Engine Under 4400 lbs	13	18	33	8	18
Multi-Engine 4400-10,000 lbs	87	52	58	46	58
Multi-Engine, Turbojet/Turbofan, 10,000-33,000 lbs	151	86	61	54	63
Multi-Engine, Other, Including Turboshaft, 10,000-33,000 lbs			34	49	87
Transports (Multi-Engine, Over 33,000 lbs)	8	7	12	29	36
Other Civil Aircraft:					
Used or Rebuilt	186	181	223	246	141
Aircraft Previously Exported from U.S.	NA	NA	NA	NA	NA
Gliders	200	229	448	628	181
Balloons & Airships	NA	NA	NA	NA	NA
Military Aircraft—TOTAL	20	14	44	75	55
New Complete Aircraft	17	7	43	66	47
Gliders	3	7	1	9	8
Balloons & Airships	NA	NA	NA	NA	NA

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U.S. IMPORTS OF COMPLETE AIRCRAFT
(Continued)

Aircraft Imports	1982	1983	1984	1985	1986
TOTAL VALUE OF AIRCRAFT (Millions of Dollars)	$1,626.8	$926.8	$1,314.6	$1,522.0	$2,084.5
Civil Aircraft—TOTAL	$1,598.9	$923.8	$1,300.5	$1,501.6	$2,049.6
New Complete Aircraft:					
Helicopters	84.9	89.5	51.3	44.7	62.6
General Aviation:					
Single-Engine	2.0	0.4	1.5	7.5	8.1
Multi-Engine Under 4400 lbs	1.7	2.5	4.2	1.5	1.5
Multi-Engine 4400-10,000 lbs	104.3	72.6	100.1	95.1	134.9
Multi-Engine, Turbojet/Turbofan, 10,000-33,000 lbs	729.7	466.4	343.8	313.1	433.5
Multi-Engine, Other, Including Turboshaft, 10,000-33,000 lbs			162.1	255.6	475.5
Transports (Multi-Engine, Over 33,000 lbs)	231.4	188.0	269.7	598.8	741.8
Other Civil Aircraft:					
Used or Rebuilt	112.0	72.8	351.8	177.2[r]	189.0
Aircraft Previously Exported from U.S.	330.0	27.9	8.8	—	—
Gliders	2.6	3.5	3.6	3.8	1.7
Balloons & Airships	0.3	0.2	3.6	4.4	0.9
Military Aircraft—TOTAL	27.9	3.0	14.1	20.4	34.9
New Complete Aircraft	27.9	2.7	14.0	19.4	34.0
Gliders	*(a)*	0.2	*(a)*	0.2	0.8
Balloons & Airships	*(a)*	0.1	0.1	0.8	0.1

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

NA Not available.

a Less than $50,000.

r Revised.

TOTAL U.S. EXPORTS AND EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1962-1986
(Millions of Dollars)

Year	TOTAL Exports[a] of U.S. Merchandise	Exports of Aerospace Products				
		TOTAL	Percent of Total U.S. Exports	Civil		Military
				Total	Transports	
1962	$ 20,431	$ 1,923	9.4%	$ 910	$ 259	$1,013
1963	23,062	1,627	7.1	732	191	895
1964	26,156	1,608	6.1	764	211	844
1965	27,127	1,618	6.0	854	353	764
1966	29,884	1,673	5.0	1,035	421	638
1967	31,142	2,248	7.2	1,380	611	868
1968	34,199	2,994	8.8	2,289	1,200	705
1969	37,462	3,138	8.4	2,027	947	1,111
1970	42,590	3,405	8.0	2,516	1,283	889
1971	43,492	4,203	9.7	3,080	1,567	1,123
1972	48,959	3,795	7.8	2,954	1,119	841
1973	70,246	5,142	7.3	3,788	1,664	1,354
1974	97,144	7,095	7.3	5,273	2,655	1,822
1975	106,561	7,792	7.3	5,324	2,397	2,468
1976	113,666	7,843	6.9	5,677	2,468	2,166
1977	119,006	7,581	6.4	5,049	1,936	2,532
1978	141,228	10,001	7.1	6,018	2,558	3,983
1979	178,798	11,747	6.6	9,772	4,998	1,975
1980	216,672	15,506	7.2	13,248	6,727	2,258
1981	228,961	17,634	7.7	13,312	7,180	4,322
1982	207,158	15,603	7.5	9,608	3,834	5,995
1983	195,969	16,065	8.2	10,595	4,683	5,470
1984	212,057	15.008	7.1	9,659	3,195	5,350
1985	206,925	18,724	9.0	12,919	5,518	5,805
1986	206,376	19,728	9.6	14,834	6,276	4,894

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT 446 (Annually); "Highlights of U.S. Export and Import Trade," Report FT 990 (Monthly).

NOTE Detail may not add to totals because of rounding.

[a] Exports of domestic merchandise including DOD shipments.

U.S. EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1982-1986
(Millions of Dollars)

Aerospace Exports	1982	1983	1984	1985	1986
TOTAL	$15,603	$16,065	$15,008	$18,724	$19,727
TOTAL CIVIL	$ 9,608	$10,595	$ 9,659	$12,919	$14,833
Complete Aircraft—TOTAL	$ 4,848	$ 5,691	$ 4,147	$ 6,694	$7,365
Transports	3,834	4,683	3,195	5,518	6,276
General Aviation[a]	517	356	268	191	243
Helicopters	206	232	234	210	277
Other, Including Used	291	420	450	775	569
Aircraft Engines—TOTAL	763	950	1,057	923	987
Turbine Engines	721	914	1,021	880	944
Piston Engines	42	36	36	43	43
Aircraft and Engine Parts Incl. Spares—TOTAL	3,997	3,954	4,455	5,302	6,481
Aircraft Parts & Accessories	2,857	2,742	3,094	3,610	4,394
Aircraft Engine Parts	1,140	1,212	1,361	1,692	2,087
TOTAL MILITARY	$ 5,995	$ 5,470	$ 5,350	$5,805	$4,894
Complete Aircraft—TOTAL[b]	$ 2,388	$ 1,845	$ 1,581	$ 2,011	$ 1,502
Fighters & Fighter Bombers	1,473	1,379	977	1,352	1,016
Transports	341	112	85	101	156
Helicopters	156	62	83	117	123
Other, Including Used	418	292	436	441	207
Aircraft Engines—TOTAL	140	172	141	146	111
Turbine Engines	136	162	125	144	108
Piston Engines	4	10	16	2	3
Aircraft and Engine Parts Incl. Spares—TOTAL	2,341	2,459	2,666	2,823	2,624
Aircraft Parts & Accessories	1,845	2,058	2,241	2,302	2,148
Aircraft Engine Parts	496	401	425	521	476
Guided Missiles, Rockets, & Parts—TOTAL	1,126	994	962	825	657
Guided Missiles & Rockets	716	443	288	404	303
Missile & Rocket Parts	378	499	646	387	321
Missile & Rocket Engines	8	28	16	14	17
Missile & Rocket Engine Parts	24	24	12	20	16

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT 446 (Annually).

[a] All fixed-wing aircraft under 33,000 pounds.

[b] Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

U.S. EXPORTS OF CIVIL AIRCRAFT

Calendar Years 1982-1986

Civil Aircraft Exports	1982	1983	1984	1985	1986
TOTAL NUMBER OF AIRCRAFT	1,557	1,088	1,045	1,050	1,327
Helicopters—TOTAL	254	216	233	137	210
Under 2200 lbs	162	141	155	68	104
Over 2200 lbs	92	75	78	69	106
General Aviation—TOTAL	940	519	425	484	464
Single-Engine	539	279	271	334	270
Multi-Engine, Under 4400 lbs	167	106	53	66	63
Multi-Engine, 4400-10,000 lbs	209	112	83	65	93
Multi-Engine, 10,000-33,000 lbs	25	22	18	19	38
Transports—TOTAL	121	129	83	152	159
Passenger Aircraft, Over 33,000 lbs	110	122	77	140	149
Cargo Aircraft, Over 33,000 lbs	6	2	3	6	2
Other, Over 33,000 lbs, Incl. Pass./Cargo Combi	5	5	3	6	8
Other Aircraft—TOTAL	242	224	304	277	494
Used or Rebuilt Aircraft	242	224	304	277	494
Other Aircraft, Including Balloons, Gliders & Kites	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$4,848	$5,691	$4,147	$6,694	$7,366
Helicopters—TOTAL	$ 206	$ 232	$ 234	$ 210	$ 277
Under 2200 lbs	45	35	45	18	29
Over 2200 lbs	161	197	189	192	248
General Aviation—TOTAL	517	356	268	191	243
Single-Engine	36	23	34	48	28
Multi-Engine, Under 4400 lbs	35	21	13	14	13
Multi-Engine, 4400-10,000 lbs	309	155	99	85	133
Multi-Engine, 10,000-33,000 lbs	137	157	122	44	69
Transports—TOTAL	3,834	4,683	3,195	5,518	6,276
Passenger Aircraft, Over 33,000 lbs	3,310	4,415	2,998	4,643	5,352
Cargo Aircraft, Over 33,000 lbs	216	37	62	334	186
Other, Over 33,000 lbs, Incl. Pass./Cargo Combi	308	231	135	541	738
Other Aircraft—TOTAL	291	420	450	775	569
Used or Rebuilt	218	298	293	333	501
Other, Including Balloons, Gliders & Kites	73	122	157	442	68

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NA Not available.

U.S. EXPORTS OF CIVIL HELICOPTERS

Calendar Years 1982-1986

Region of Destination	1982	1983	1984	1985	1986
TOTAL NUMBER EXPORTED	254	216	233	137	210
Canada & Greenland	17	16	8	12	12
Latin America & Caribbean	63	38	32	25	39
Europe	49	51	89	18	45
Middle East	13	48	12	6	26
Asia	38	44	62	51	54
Oceania	21	8	25	18	19
Africa	53	11	5	7	15
TOTAL VALUE (Millions of Dollars)	$205.9	$232.1	$233.8	$209.8	$277.3
Canada & Greenland	$ 15.2	$ 9.7	$ 4.1	$ 5.0	$ 3.2
Latin America & Caribbean	49.5	47.0	42.0	19.0	24.4
Europe	42.0	50.7	52.8	5.4	25.6
Middle East	12.9	48.6	16.3	24.5	78.7
Asia	50.4	59.2	107.5	141.1	125.7
Oceania	10.6	1.1	9.3	9.5	7.8
Africa	25.3	15.8	1.8	5.3	11.9

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

U.S. IMPORTS OF CIVIL HELICOPTERS

Calendar Years 1982-1986

Country of Origin	1982	1983	1984	1985	1986
TOTAL NUMBER IMPORTED	184	100	61	60	87
France	167	46	13	13	21
Germany	15	48	16	35	55
Italy	1	1	30	8	8
United Kingdom	1	5	2	4	3
TOTAL VALUE (Millions of Dollars)	$ 84.9	$ 89.5	$51.3	$44.7	$62.6
France	$ 74.2	$ 39.6	$14.9	$13.7	$10.8
Germany	8.9	35.8	9.7	19.9	43.9
Italy	1.1	0.8	19.2	3.9	5.7
United Kingdom	0.7	13.3	7.5	7.2	2.2

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

U.S. EXPORTS OF GENERAL AVIATION AIRCRAFT[a]

Calendar Years 1982-1986

Region of Destination	1982	1983	1984	1985	1986
TOTAL NUMBER EXPORTED ...	940	519	425	484	464
Canada & Greenland	94	43	49	44	50
Latin America & Caribbean	348	204	108	175	166
Europe	226	102	113	111	146
Middle East	32	13	10	33	8
Asia	40	30	47	55	42
Oceania	113	43	62	49	33
Africa	87	84	36	17	19
TOTAL VALUE (Millions of Dollars)	$516.6	$356.0	$267.8	$191.1	$243.1
Canada & Greenland	$ 19.3	$ 13.6	$ 23.7	$ 15.1	$ 10.5
Latin America & Caribbean	166.3	66.0	33.3	44.0	48.6
Europe	178.3	92.9	60.6	57.2	92.6
Middle East	18.6	86.2	62.2	3.9	6.8
Asia	25.3	31.4	48.1	40.4	48.8
Oceania	45.1	16.1	8.6	19.4	16.7
Africa	63.7	49.8	31.3	11.1	19.0

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

[a] All fixed-wing aircraft under 33,000 pounds.

U.S. IMPORTS OF GENERAL AVIATION AIRCRAFT

Calendar Years 1982-1986

Country of Origin	1982	1983	1984	1985	1986
TOTAL NUMBER IMPORTED	274	162	207	203	297
Brazil	24	15	14	10	13
Canada	58	38	27	26	34
France	48	19	30	49	99
Israel	22	9	24	9	13
Japan	52	17	15	8	10
Netherlands	—	—	3	6	10
United Kingdom	36	36	53	58	79
Other	34	28	41	37	39
TOTAL VALUE (Millions of Dollars)	$837.7	$541.9	$611.7	$672.7	$1,053.5
Brazil	$ 40.2	$ 26.9	$ 23.9	$ 26.3	$ 62.8
Canada	306.9	208.4	159.6	173.1	229.8
France	222.6	104.3	95.7	83.9	196.1
Israel	72.9	31.7	85.2	33.0	54.8
Japan	37.7	16.2	14.8	7.7	8.6
Netherlands	—	—	18.2	35.0	56.9
United Kingdom	143.9	137.0	198.1	200.7	297.9
Other	13.5	17.4	16.2	113.0	146.6

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

U.S. EXPORTS OF COMMERCIAL TRANSPORT AIRCRAFT

33,000 Pounds and Over Airframe Weight
Calendar Years 1982-1986

Region of Destination	1982	1983	1984	1985	1986
TOTAL NUMBER EXPORTED	121	129	83	152	159
Canada	13	8	6	4	2
Latin America & Caribbean	13	8	3	4	9
Europe	31	57	34	72	69
Middle East	13	10	9	8	11
Asia	25	30	23	49	35
Oceania	8	4	2	7	30
Africa	18	12	6	8	3
TOTAL VALUE (Millions of Dollars)	$3,834	$4,683	$3,195	$5,518	$6,276
Canada	$ 294	$ 280	$ 265	$ 84	46
Latin America & Caribbean	301	304	69	234	343
Europe	938	1,785	1,008	2,050	2,284
Middle East	699	291	242	438	613
Asia	1,096	1,464	1,165	2,124	1,957
Oceania	234	180	137	437	927
Africa	272	379	309	151	104

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

U.S. EXPORTS OF MILITARY AIRCRAFT[a]

Calendar Years 1982-1986

	1982	1983	1984	1985	1986
TOTAL NUMBER OF AIRCRAFT	637	936	381	313	405
Fighters & Fighter Bombers	154	93	110	91	68
Transports	32	15	6	6	11
Helicopters	55	55	32	38	45
New Aircraft, NEC	228	124	227	141	271
Used or Rebuilt Aircraft	168	649	6	37	10
Airships, Balloons, Gliders, etc.	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$2,388	$1,845	$1,581	$2,011	$1,502
Fighters & Fighter Bombers	$1,473	$1,378	$ 977	$1,352	$1,016
Transports	341	112	85	101	156
Helicopters	156	62	83	117	123
New Aircraft, NEC	361	248	410	357	178
Used or Rebuilt Aircraft	16	22	6	59	6
Airships, Balloons, Gliders, etc.	41	23	20	25	23

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NEC: Not elsewhere classified.
NA: Not available
[a] Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

U.S. EXPORTS OF AIRCRAFT ENGINES

Calendar Years 1984-1986
(Millions of Dollars)

	1984		1985		1986	
	Number	Value	Number	Value	Number	Value
TOTAL	3,815	$1,199	6,577	$1,069	4,582	$1,098
Turbine Engines-New	828	$ 706	1,942	$ 699	801	$ 630
Civil	573	589	1,748	570	702	531
Military	255	117	194	129	99	99
Turbine Engines-Used	744	441	619	325	676	422
Civil	691	433	569	310	640	413
Military	53	8	50	15	36	9
Piston Engines	2,243	52	4,016	45	3,105	46
Civil, New, Under 500 HP	855	12	854	11	851	13
Civil, New, Over 500 HP	100	4	1,688	8	695	9
Civil, Used	1,198	20	1,402	24	1,415	21
Military	90	16	72	2	144	3

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

U.S. IMPORTS OF TURBINE AIRCRAFT ENGINES[a]

Calendar Years 1984-1986
(Millions of Dollars)

	1984		1985		1986	
	Number	Value	Number	Value	Number	Value
Turbine Engines	$2,185	$861	2,010	$1,226	2,274	$1,397
Civil	1,832	738	1,760	1,011	1,829	1,114
Military	353	123	250	215	445	283

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

[a] New and used.

EXPORT-IMPORT BANK LENDING AUTHORITY AND GROSS AUTHORIZATIONS SUMMARY

Fiscal Years 1978-1987 (Millions of Dollars)

LOANS[a]

Year	Lending Authority[c]	Authorizations Summary				
		TOTAL Direct Loans[a]	Regular Loans			Discount Loans, Medium Term, and Small Business Credits
			Total Regular Loans[a]	Direct Credits	CFF[b] & Relending	
1978	$3,600	$3,425	$2,927	$2,872	$ 55	$ 497
1979	3,750	4,475	3,825	3,725	100	650
1980	4,001	4,578	4,087	4,045	42	491
1981	5,461	5,431	5,079	5,045	34	352
1982	4,400	3,516	3,104	3,104	(*b*)	412
1983	4,400	845	685	685	(*b*)	160
1984	3,865	1,465	1,122	1,122	(*b*)	343
1985	3,865	659	320	320	(*b*)	339
1986	1,059	578	371	371	(*b*)	207
1987[E]	900	NA	NA	NA	(*b*)	NA

GUARANTEES AND INSURANCE

Year	Lending Authority	Authorizations Summary		
		TOTAL Guarantees and Insurance	Guarantees	Insurance
1978	$ (*d*)	$3,951	$ 589	$3,362
1979	(*d*)	5,016	908	4,108
1980	(*d*)	8,032	2,510	5,522
1981	8,059	7,416	1,506	5,910
1982	9,220	5,832	727	5,105
1983	9,000	8,525	1,741	6,784
1984	10,000	7,151	1,333	5,818
1985	10,000	7,850	1,320	6,530
1986	11,484[f]	5,508	1,128	4,380
1987[E]	11,355[f]	NA	NA	NA

Source: Export-Import Bank of the United States.

NOTE: Detail may not add to totals because of rounding.

[a] Discount Loans excluded from loan lending authority limitation until FY 1981. Comparable authorization data for 1980 and prior years are therefore listed under Total Regular Loans, which include Direct Credits, CFF and Relending Loans. For 1981 and subsequent years, compare TOTAL Direct Loans authorization data with Lending Authority, both of which include Discount Loans. The value of Loans may exceed Lending Authority because of the inclusion in Loans of the full amount of Certificates of Loan Participation (COLPs), portions of which are subsequently sold to commercial banks.

[b] CFF (Cooperative Financing Facility) program discontinued after 1981.

[c] Effective 1981, lending authority includes discount loans as well as direct loans.

[d] Limitation for Guarantees and Insurance began in 1981.

[E] Estimate. Latest year represents Administration's budget proposal.

[f] Includes $1,800 million proposed I-MATCH Program, which would replace direct lending and would allow an estimated $100 million in commercial loan interest buy-down.

NA Not available.

EXPORT-IMPORT BANK TOTAL AUTHORIZATIONS OF LOANS AND GUARANTEES AND AUTHORIZATIONS IN SUPPORT OF AIRCRAFT EXPORTS[r]

Fiscal Years 1976-1986
(Millions of Dollars)

Year	TOTAL AUTHORIZATIONS	Authorizations in Support of Aircraft Exports			
		TOTAL	Percent of TOTAL Authorizations	Commercial Jet Aircraft[a]	Other Aircraft[b]
LOANS[c]					
1976	3,489	475.5	13.6	398.4	77.1
Tr. Qtr.	448	98.3	21.9	93.8	4.5
1977	1,221	156.1	12.8	137.6	18.5
1978	3,425	237.8	6.9	189.5	48.3
1979	4,475	1,469.4	32.8	1,399.4	70.0
1980	4,578	1,743.3	38.1	1,692.6	50.7
1981	5,431	2,576.6	47.4	2,550.3	26.3
1982	3,516	263.9	7.5	199.1	64.8
1983	845	396.7	46.9	383.8	12.9
1984	1,465	608.0	41.5	531.8	76.2
1985	659	39.7	6.0	15.2	24.5
1986	578	54.6	9.4	46.3	8.3
GUARANTEES[d]					
1976	1,661	107.6	6.5	87.2	20.4
Tr. Qtr.	272	62.6	23.0	58.7	3.9
1977	1,021	307.5	30.1	293.9	13.6
1978	589	97.6	16.6	77.2	20.4
1979	908	261.4	28.8	239.3	22.1
1980	2,510	1,131.9	45.1	1,088.1	43.8
1981	1,506	562.6	37.4	533.4	29.2
1982	727	104.2	14.3	78.4	25.8
1983	1,741	629.6	36.2	601.3	28.3
1984	1,333	355.5	26.7	293.5	62.0
1985	1,320	322.4	24.4	290.0	32.4
1986	1,128	329.2	29.2	277.4	51.8

Source: Export-Import Bank of the United States.

[a] Includes complete aircraft, related engines and parts, and retrofits.

[b] Includes business aircraft, general aviation aircraft, helicopters, and related goods and services. Data revised to include Discount Loans.

[c] Loans are commitments for financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits, loans authorized under the Cooperative Financing Facility (CFF), (until the termination of the CFF program in 1981), and Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank, in which case the value of the loans is also included with Guarantees.

[d] Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions. Excludes insurance.

[r] Revised to include Discount Loans and corrected data.

EXPORT-IMPORT BANK
SUMMARY OF COMMERCIAL JET AIRCRAFT AUTHORIZATIONS FOR LOANS[a] AND GUARANTEES[b]

Fiscal Years 1957-1986
(Values in Millions of Dollars)

Year	No. of Jet Aircraft[c]		Export Value[c]		No. of New Commitments		Gross Authorizations	
	Loans	Guarantees	Loans	Guarantees	Loans	Guarantees	Loans	Guarantees
New Authorizations:								
1957[d]-1968	322	53	$ 2,572	$ 331	92	58	$ 1,520	$ 274
1969	55	23	451	207	23	18	197	111
1970	142	1	1,749	3	44	38	598	79
1971	126	9	1,539	40	58	49	481	363
1972	145	2	1,334	9	44	29	475	183
1973	129	4	1,729	25	60	23	690	191
1974	189	—	2,195	—	79	22	895	133
1975	136	1	2,070	5	64	10	691	64
1976	77	6	1,017	139	34	11	398	87
Tr. Qtr.	15	5	219	182	6	3	94	59
1977	31	25	330	902	16	14	138	294
1978	29	5	479	253	18	5	189	77
1979	118	7	2,938	317	35	10	1,399	239
1980	136	21	3,975	901	36	24	1,693	1,088
1981	121	18	4,568	637	26	17	2,550	533
1982	11	6	441	113	5	2	199	78
1983	21	9	779	619	3	4	384	601
1984	37	8	1,023	327	7	4	532	294
1985	—	14	19	481	1	5	13	289
1986	3	14	74	451	1	9	46	277
Cumulative New Authorizations[r]	1,843	231	29,599	5,943	652	355	13,182	5,314
Transfers, Reversals, & Participation	—	—	(8)	8	4	—	(140)	(20)
Cumulative Gross Authorizations (net of Adjustments)[r]	1,843	231	29,491	5,951	656	355	13,042	5,294

Source: Export-Import Bank of the United States.

NOTE: Detail may not add to totals because of rounding.

[a] Loans are commitments for direct financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits and loans authorized under the Cooperative Financing Facility (CFF) until the termination of the CFF program in 1981, but excluding Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank, in which case the value of the loans is included with Guarantees.

[b] Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions.

[c] For Export-Import Bank commitments including both loan and guarantee authorization, number of aircraft and export value reported under "Loans."

[d] First year of commercial jet aircraft authorizations.

[r] Revised.

EXPORT-IMPORT BANK AUTHORIZATIONS OF LOANS AND GUARANTEES IN SUPPORT OF EXPORTS OF COMMERCIAL JET AIRCRAFT

Fiscal Years 1984-1986
(Values in Millions of Dollars)

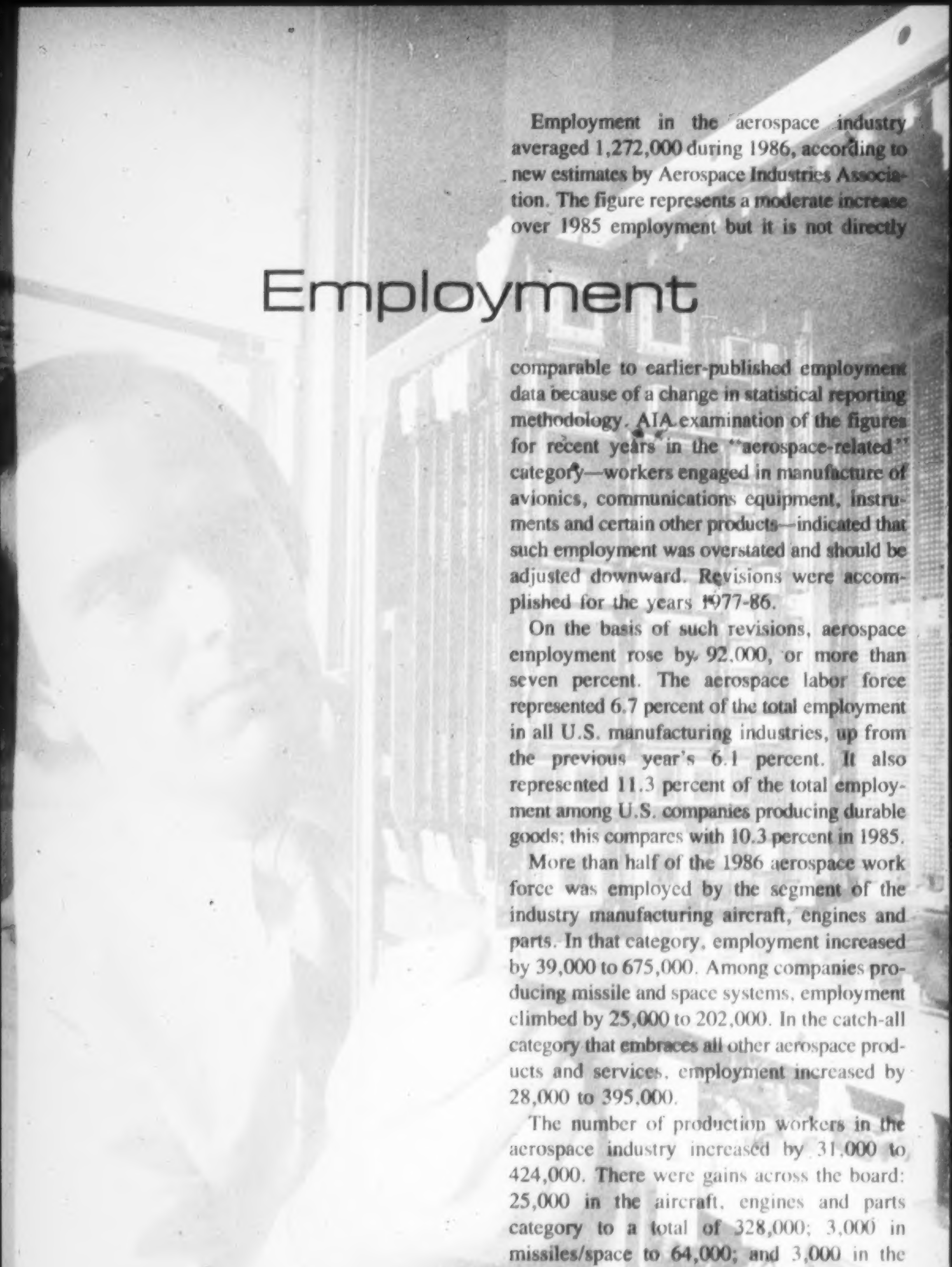
Customer (Country/Airline)	Number and Aircraft Model or Related Product	Export Value	Authorization				
			Loans (Direct Credits)				Guarantees
			Amount	Percent Coverage[a]	Interest Rate	Repayment Terms[b]	Amount
FY 1986							
TOTALS	16 aircraft	$ 525.5	$ 46.3	—	—	—	$277.4
Brazil/Ministry of Aeronautics	tools for engine overhaul	6.9	—	—	—	—	5.9
Chile/Lan-Chile, S.A.	2 X 767	96.2	—	—	—	—	40.0
Finland/Finnair	3 X MD-87	74.2	46.3	62.5	8.40	20-S	—
Gabon/Air Gabon	1 X 100-30	22.7	—	—	—	—	19.3
Jamaica/Air Jamaica	engines	4.3	—	—	—	—	3.6
Yugoslavia/Inex Adria Airways	engines	2.2	—	—	—	—	1.9
Yugoslavia/Boeing	2 X 737	69.9	—	—	—	—	59.4
Yugoslavia/McDonnell Douglas	1 x MD-82	21.8	—	—	—	—	18.6
Zimbabwe/Boeing	3 X 737	66.2	—	—	—	—	56.2
Japan/All Nippon Airways	4 X 767	161.1	—	—	—	—	72.5
FY 1985							
TOTALS	14 aircraft	$ 500.7	$ 12.6	—	—	—	$288.9
Morocco/Royal Air Maroc	—	—	—	—	—	—	(1.1) (c)
Japan/All Nippon Airways	8 X 767	297.8	—	—	—	—	134.0
	engines	19.4	12.6	65.0	12.00	20-S	—
Yugoslavia/Jugoslovenski	2 X 737	60.8	—	—	—	—	51.7
Aerotransport Yugoslavia/Inex Adria Aviopromet	1 X DC-9	22.4	—	—	—	—	19.0
Brazil/Viacao Aerea Sao Paulo	engines	25.1	—	—	—	—	21.4
Mexico/Aironaves De Mexico	3 X DC-9	75.2	—	—	—	—	63.9

(Continued on next page)

EXPORT-IMPORT BANK
LOAN AND GUARANTEE AUTHORIZATIONS (Continued)

Customer (Country/Airline)	Number and Aircraft Model or Related Product	Export Value	Authorization				
			Loans (Direct Credits)				Guarantees
			Amount	Percent Coverage[a]	Interest Rate	Repayment Terms[b]	Amount
FY 1984							
TOTALS	45 aircraft	$1,350.3	$531.8	—	—	—	$293.5
Angola/Banco Nacional	1 X 737-200	$ 18.5	$ —	—%	—%	—	$ 12.0
Canada/Canadian Pacific ...	5 X 737-300	129.1	80.7	62.5	12.00	15-S	—
Denmark/Maersk Air	2 X 737-300	52.3	32.7	62.5	12.00	15-S	—
Egypt/Egyptair	3 X 767-200	173.0	147.0	85.0	12.00 12.50	20-S	—
Ethiopia/Ethiopian Airlines ..	2 X 767-200	113.1	—	—	—	—	48.0
Finland/Finnair	1 X MD-80	26.5	14.0	52.7	12.00	20-S	—
Italy/Alitalia	16 X MD-80	412.9	145.5	35.2	12.00	10-S	145.5
Japan/All Nippon Airways ...	5 X 767-200	195.5	—	—	—	—	88.0
Jordan/Alia	4 X L-1011-500	72.0	45.0	62.5	12.00	15-S	—
Pakistan/Pakistan Int'l	6 X 737-300	157.4	66.9	42.5	12.00	10-S	—

Source: Aerospace Industries Association, based on data from the Export-Import Bank of the United States.
NOTE: For definitions of Loans and Guarantees, see Export-Import Bank tables on previous pages.
a Amount of loan as percent of export value.
b Number of payments and frequency (S = semi-annual)
c Reflects change from Exim guaranteed financing to non guaranteed financing.



Employment

Employment in the aerospace industry averaged 1,272,000 during 1986, according to new estimates by Aerospace Industries Association. The figure represents a moderate increase over 1985 employment but it is not directly comparable to earlier-published employment data because of a change in statistical reporting methodology. AIA examination of the figures for recent years in the "aerospace-related" category—workers engaged in manufacture of avionics, communications equipment, instruments and certain other products—indicated that such employment was overstated and should be adjusted downward. Revisions were accomplished for the years 1977-86.

On the basis of such revisions, aerospace employment rose by 92,000, or more than seven percent. The aerospace labor force represented 6.7 percent of the total employment in all U.S. manufacturing industries, up from the previous year's 6.1 percent. It also represented 11.3 percent of the total employment among U.S. companies producing durable goods; this compares with 10.3 percent in 1985.

More than half of the 1986 aerospace work force was employed by the segment of the industry manufacturing aircraft, engines and parts. In that category, employment increased by 39,000 to 675,000. Among companies producing missile and space systems, employment climbed by 25,000 to 202,000. In the catch-all category that embraces all other aerospace products and services, employment increased by 28,000 to 395,000.

The number of production workers in the aerospace industry increased by 31,000 to 424,000. There were gains across the board: 25,000 in the aircraft, engines and parts category to a total of 328,000; 3,000 in missiles/space to 64,000; and 3,000 in the catch-all "other" grouping to 32,000.

The aerospace industry's annual payroll for 1986 totaled $30.9 billion, including lump sum wage payments made by many aerospace firms in lieu of general wage or cost of living increases. This figure was adjusted to reflect the revision in employment data, hence is not directly comparable to previously-published annual payroll estimates. A breakdown shows a payroll of $12.1 billion for production workers and $18.8 billion for the "other" categories. The total aerospace payroll represented 6.6 percent of combined payroll outlays by all U.S. manufacturing industries.

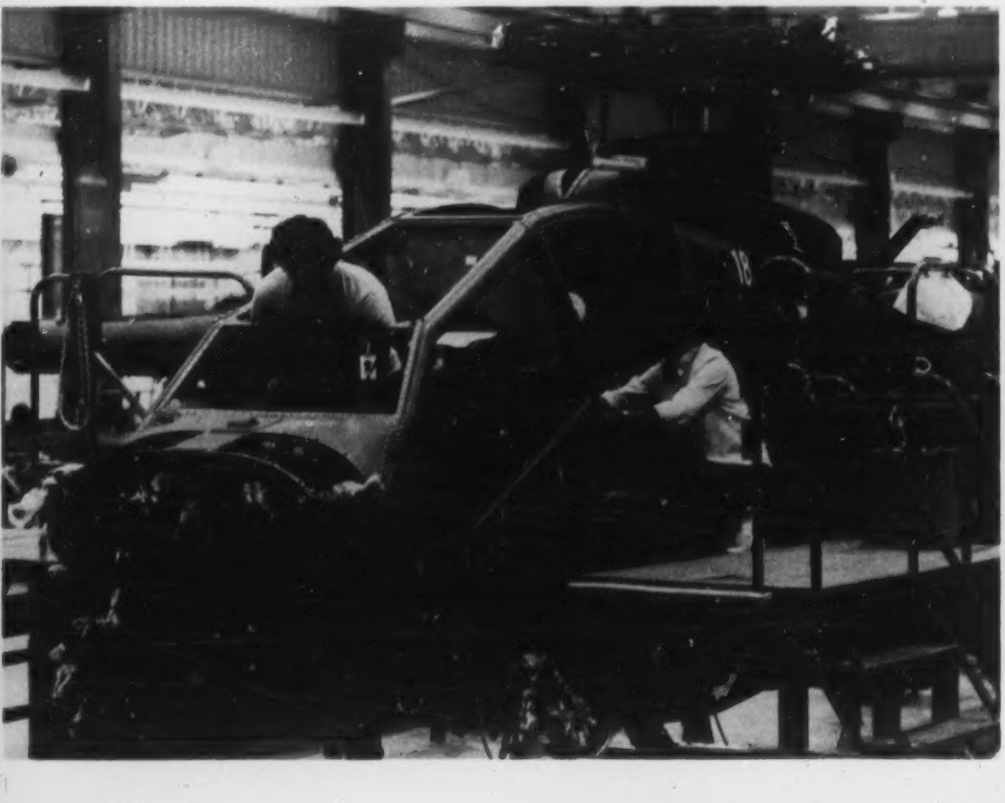
Average hourly earnings for aerospace production workers—again including lump sum payments—came to $12.89 in 1986, up from $12.62 in 1985. Average weekly earnings amounted to $550.24, up from $532.77. The average work week for production personnel was 42.7 hours, up from 42.2 hours.

As is customary, the Pacific region dominated in a yearend geographic breakdown of aerospace employment with 41.2 percent of the total. Next, in order, were the Middle Atlantic region (13.2 percent); New England (12.7 percent); West North Central (10.4 percent); South Atlantic (7.9 percent); South Central (6.3 percent); Mountain (4.7 percent) and East North Central (3.6 percent). The relative rankings were the same in 1985 except for a switch in the latter two.

The Pacific region also led in all categories in a breakdown by product group. In manufacture of civil aircraft, 61.3 percent of the total personnel were employed by Pacific firms. New England placed second (14.8 percent) and West North Central third (7.7 percent).

Employment in production of military aircraft was more evenly spread: 26.4 percent in the Pacific area, followed by 20.1 percent in Middle Atlantic, 13.1 percent in South Central, 12.7 percent in West North Central and 10.7 percent in New England.

In missile manufacture, the Mountain and Pacific regions headed the list with 51.4 percent, followed by New England (23.8 percent) and South Atlantic (13.1 percent). Pacific topped the space employment category with 58.1 percent, while the Mountain area accounted for 15.6 percent and New England for 14.7 percent.



ANNUAL AVERAGE EMPLOYMENT IN ALL MANUFACTURING, DURABLE GOODS AND AEROSPACE INDUSTRIES

Calendar Years 1977-1986
(Thousands of Employees)

Year	All Manufacturing Industries	Durable Goods Industries	Aerospace Industry[a]		
			TOTAL	As Percent of	
				All Manufacturing	Durable Goods
1977	19,682	11,597	820	4.2	7.1
1978	20,505	12,274	901	4.4	7.3
1979	21,040	12,760	1,034	4.9	8.1
1980	20,285	12,187	1,108	5.5	9.1
1981	20,170	12,109	1,115	5.5	9.2
1982	18,781	11,039	1,063	5.6	9.6
1983	18,434	10,732	1,043	5.6	9.7
1984[r]	19,378	11,505	1,084	5.6	9.4
1985[r]	19,260	11,490	1,180	6.1	10.3
1986	18,994	11,244	1,272	6.7	11.3

Source: Manufacturing and Durable Goods Employment from Bureau of Labor Statistics, "Employment and Earnings" (Monthly); Aerospace Employment from Aerospace Industries Association estimates based on "Employment and Earnings," Bureau of Labor Statistics.

NOTE: For explanation of "Aerospace Employment," see the Glossary.

[a] AIA employment data for 1977-1986 were substantially revised in 1987 to better account for aerospace industry related employment.

[r] Revised.

ANNUAL PAYROLL
AEROSPACE INDUSTRY AND ALL MANUFACTURING INDUSTRIES[d]

Calendar Years 1977-1986
(Millions of Dollars)

Year	All Manufacturing Industries[b]	Aerospace[a]			Aerospace As Percent of All Manufacturing
		TOTAL	Production Workers	Other	
1977	266,000	$11,127	$ 4,445	$ 6,682	4.2%
1978	299,200	13,356	5,442	7,914	4.5
1979	333,900	16,830	7,184	9,646	5.0
1980	354,600	19,969	8,509	11,460	5.6
1981	385,300	22,113	9,046	13,067	5.7
1982	382,900	23,071	8,938	14,133	6.0
1983	397,400	23,243	8,948	14,295	5.8
1984	439,100[r]	26,153	9,694	16,459	6.0
1985	460,900[r]	28,113	10,807	17,306	6.1
1986	457,500	30,832	11,992	18,840	6.6

AEROSPACE—INCLUDING LUMP-SUM PAYMENTS[c]

Year	TOTAL	Production Workers	Other	Aerospace As Percent of All Manufacturing
1984	$26,210	$ 9,751	$16,459	6.0%
1985	28,194	10,888	17,306	6.1
1986	30,943	12,103	18,840	6.6

Source: Manufacturing Payroll from Bureau of Economic Analysis, "Survey of Current Business;" Aerospace Payroll from Aerospace Industries Association estimates.

[a] Based on AIA estimates of annual average employment and earnings for the aerospace industry; derived from BLS data (see Glossary, "Aerospace Employment" and "Aerospace Payroll").

[b] See Glossary, "Payroll, All Manufacturing."

[c] Many aerospace manufacturers have included lump-sum payments in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments. These payments are included in a separate wage series for SIC 3721 (Airframes) by the Bureau of Labor Statistics and are included in the totals for production workers and all aerospace by AIA.

[d] Aerospace employment data covering the period 1977 to 1986 were revised in 1987. As a result, aerospace payroll data over the period have been adjusted to reflect the revised employment figures.

[r] Revised.

EMPLOYMENT IN THE AEROSPACE INDUSTRY[a]

Calendar Years 1977-1986
(Annual Average, Thousands of Employees)

Year	TOTAL	Aircraft, Engines, & Parts (SIC 372)	Missiles & Space Vehicles (SIC 376)	Other
TOTAL EMPLOYMENT				
1977	820	482	83	255
1978	901	527	93	280
1979	1,034	611	102	321
1980	1,108	652	111	345
1981	1,115	646	123	347
1982	1,063	601	131	330
1983	1,043	578	141	324
1984	1,084	593	154	337
1985	1,180	636	177	367
1986	1,272	675	202	395
PRODUCTION WORKERS				
1977	295	247	26	22
1978	329	275	29	25
1979	394	332	33	29
1980	421	355	35	31
1981	410	343	37	31
1982	373	305	40	28
1983	354	283	46	26
1984	363	285	52	27
1985	393	303	61	29
1986	423	328	64	32

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

NOTE AIA employment data for 1977-1986 were substantially revised in 1987 to better account for aerospace industry related employment.

[a] See Glossary for detailed explanation of "Aerospace Employment."

[b] Communications, navigation, flight control, and displays (aerospace-related portions of SICs 3662, 381, & 382).

EMPLOYMENT IN THE AIRCRAFT, ENGINES, AND PARTS INDUSTRY[a]

Calendar Years 1977-1986
(Annual Average, Thousands of Employees)

Year	TOTAL (SIC 372)	Airframes (SIC 3721)	Engines and Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)
TOTAL EMPLOYMENT				
1977	481.7	270.4	120.9	90.4
1978	527.2	288.3	133.5	105.5
1979	610.8	333.2	151.6	126.1
1980	652.3	349.3	162.9	140.1
1981	645.5	344.2	162.5	138.8
1982	601.1	319.9	148.8	132.3
1983	578.3	304.7	140.1	133.6
1984[r]	592.7	306.1	140.2	146.4
1985[r]	635.8	325.6	147.5	162.7
1986	674.8	339.0	153.1	182.8
PRODUCTION WORKERS				
1977	246.8	124.4	66.6	55.8
1978	275.4	133.9	75.3	66.2
1979	332.1	165.9	86.4	79.8
1980	354.6	173.7	93.0	88.0
1981	343.0	167.0	92.4	83.6
1982	305.4	144.7	84.2	76.6
1983	282.5	131.5	74.7	76.3
1984[r]	284.6	128.2	73.0	83.5
1985[r]	303.8	135.5	74.8	93.6
1986	330.9	146.6	78.4	105.9

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).
NOTE: Detail may not add to totals because of rounding.
[a] See Glossary for detailed explanation of "Aerospace Employment."
[r] Revised.

AEROSPACE INDUSTRY EMPLOYMENT BY OCCUPATIONAL CLASSIFICATION

As of December 1977-1987 (Thousands of Employees)

Year	TOTAL[a]	Production Workers	Scientists & Engineers	Technicians	Others
1977[b]	665	280	139	46	200
1978	720	337	130	50	203
1979	842	396	146	56	244
1980	902	414	158	62	268
1981	900	399	156	69	276
1982	831	367	151	59	254
1983[b]	830	351	156	66	257
1984	850	364	160	67	259
1985	939	392	175	67	305
1986[p]	968	404	174	65	325
1987[E]	957	401	175	64	317

Source: Aerospace Industries Association, based on company reports and data from the Bureau of Labor Statistics.

NOTE AIA employment data for 1977-1987 were substantially revised in 1987 to better account for aerospace industry related employment and are not comparable to previously published figures. Totals for employment by occupational classification reflect only companies in sics 372, 376, 3662, 381 and 382. As a result, they do no match the totals for aerospace employment by product group which include other industries with employment related to aerospace.

[a] End-of-year totals differ from annual averages appearing in other tables.

[b] Industry strike during this period.

[E] Estimate.

[p] Preliminary

GEOGRAPHIC DISTRIBUTION OF AEROSPACE EMPLOYMENT[a] BY OCCUPATIONAL CLASSIFICATION AND PRODUCT GROUP

As of December 1986

OCCUPATIONAL CLASSIFICATION

Region	TOTAL	Production Workers	Scientists & Engineers	Technicians	All Others
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%
New England	12.7%	16.4%	9.1%	10.7%	11.3%
Middle Atlantic	13.2	12.4	13.0	11.8	14.6
East North Central	3.6	4.8	2.7	2.5	3.1
West North Central	10.4	10.9	10.4	11.1	9.6
South Atlantic	7.9	6.9	6.5	9.7	9.6
South Central	6.3	7.6	4.9	4.6	6.2
Mountain	4.7	4.0	5.4	4.8	4.9
Pacific	41.2	37.0	48.0	44.8	40.7

PRODUCT GROUP

Region	Aircraft		Missiles	Space	Other	
	Civil	Military			Aerospace	Non-Aerospace
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100%
New England	14.8%	10.7%	23.8%	14.7%	16.2%	21.7%
Middle Atlantic	1.0	20.1	5.5		14.2	
East North Central	3.5	6.3	0.2	0.5	3.1	16.8
West North Central	7.7	12.7	5.6		14.5	
South Atlantic	2.2	8.5	13.1		9.0	1.4
South Central	4.8	13.1	0.4	11.1	4.0	0.6
Mountain	4.7	2.2		15.6	39.0	59.5
Pacific	61.3	26.4	51.4	58.1		

Source: Aerospace Industries Association, company reports.

NOTE: Data for two regions are combined where employment for one region within a product group represented three or fewer companies.

[a] Employment in 40 surveyed aerospace manufacturing companies representing approximately two-thirds of total industry employment.

TOTAL EMPLOYMENT AND SCIENTISTS & ENGINEERS IN COMMERCIAL TRANSPORT AIRCRAFT & HELICOPTER MANUFACTURING ESTABLISHMENTS[b]

As of December 1977-1987

Year	Commercial Transport Aircraft		Helicopters	
	Total	Scientists & Engineers	Total	Scientists & Engineers
1977[a]	55,900	8,100	21,100	3,500
1978	58,700	8,700	24,200	3,300
1979	99,800	12,900	27,500	3,000
1980	106,500	13,700	29,800	3,200
1981	84,000	12,000	28,000	3,000
1982	69,800	11,100	26,600	3,100
1983[a]	48,200	8,400	27,600	3,500
1984	57,600	9,300	31,300	3,800
1985	58,700	10,000	34,200	4,300
1986[p]	61,500	11,500	36,600	4,600
1987[E]	62,100	12,900	38,100	4,900

Source: Aerospace Industries Association, company reports.

NOTE: AIA employment data for 1977-1987 were substantially revised in 1987 to better account for aerospace industry related employment.

[E] Estimate.

[a] Industry strike during this period.

[b] Includes only establishments identified as prime manufacturers of commercial transport aircraft and of civil and military helicopters. Excluses subcontractors and propulsion manufacturers.

[p] Preliminary.

AVERAGE HOURLY EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1986

Year	TOTAL[a]	Aircraft (SIC 372)				Guided Missiles, Space Vehicles & Parts (SIC 376)
		TOTAL	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)	
AVERAGE HOURLY EARNINGS[b]						
1972	$ 4.63	$ 4.62	$ 4.65	$ 4.72	$ 4.42	$ 4.75
1973	4.99	4.99	5.09	5.04	4.70	5.02
1974	5.43	5.42	5.58	5.41	5.05	5.48
1975	6.00	6.00	6.21	6.04	5.47	6.02
1976	6.44	6.44	6.63	6.46	5.95	6.48
1977	6.93	6.92	7.07	7.05	6.44	7.04
1978	7.54	7.54	7.70	7.80	6.93	7.56
1979	8.26	8.26	8.50	8.53	7.48	8.25
1980	9.27	9.28	9.66	9.42	8.40	9.22
1981	10.29	10.31	10.74	10.41	9.35	10.06
1982	11.20	11.23	11.85	11.16	10.18[r]	10.96[r]
1983	11.79	11.82	12.58	11.61	10.73	11.61
1984	12.25	12.32	12.91	12.40	11.37	11.88
1985	12.53	12.62	13.18	12.85	11.63	12.06
1986	12.76	12.87	13.48	13.08	11.91	12.21
AVERAGE HOURLY EARNINGS INCLUDING LUMP-SUM WAGE PAYMENTS[c]						
1984	$12.33	$12.42	$13.11	$12.40	$11.37	$ 11.88
1985	12.62	12.73	13.40	12.85	11.63	12.06
1986	12.89	13.02	13.80	13.08	11.91	12.15

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] TOTAL column is a weighted average based on BLS employment data.

[b] Includes overtime premiums.

[c] *Many aerospace manufacturers have included lump-sum payments in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments. These payments are included in SIC 3721 as well as the totals for SIC 372 and for all aerospace.*

AVERAGE WEEKLY EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1985*

Year	TOTAL[a]	Aircraft (SIC 372)				Guided Missiles, Space Vehicles & Parts (SIC 376)
		TOTAL	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)	
AVERAGE WEEKLY EARNINGS[b]						
1972	$186.62	$185.26	$180.89	$193.52	$186.52	$199.50
1973	202.95	202.10	199.53	209.66	199.75	211.34
1974	221.10	220.59	222.08	221.81	213.62	226.32
1975	247.53	247.80	255.85	247.04	228.65	245.01
1976	263.31	263.40	273.16	259.69	245.74	262.44
1977	289.76	289.95	296.23	291.87	273.70	287.94
1978	318.05	318.19	324.17	325.26	298.68	316.76
1979	350.64	351.05	359.55	360.82	322.39	346.50
1980	388.71	389.76	403.79	393.76	357.84	378.02
1981	424.31	425.80	443.56	421.61	396.44	410.45
1982	459.99	461.55	484.67	454.21	426.54	448.26
1983	486.10	486.98	526.73	476.01	452.81	480.65
1984	513.55	516.21	531.89	523.28	485.50	498.96
1985	528.82	532.56	546.97	542.27	504.74	510.14
1986	545.20	550.84	567.51	561.13	520.47	517.70
AVERAGE WEEKLY EARNINGS INCLUDING LUMP-SUM PAYMENTS[c]						
1984	$516.58	$519.79	$540.13	$523.28	$485.50	$498.96
1985	532.77	537.30	556.10	542.27	504.74	510.14
1986	550.24	556.91	580.98	561.13	520.47	517.70

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] TOTAL column is a weighted average based on BLS employment data.

[b] Includes overtime premiums.

[c] Many aerospace manufacturers have included lump-sum payments in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments. These payments are included in SIC 3721 as well as the totals for SIC 372 and for all aerospace.

AVERAGE HOURS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1986

AVERAGE WEEKLY HOURS

Year	TOTAL[a]	Aircraft (SIC 372)				Guided Missiles, Space Vehicles & Parts (SIC 376)
		TOTAL	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)	
1972	40.2	40.0	38.9	40.9	42.2	41.9
1973	40.6	40.5	39.2	41.6	42.5	42.1
1974	40.8	40.7	39.8	41.0	42.3	41.3
1975	41.2	41.3	41.2	40.9	41.8	40.7
1976	40.9	40.9	41.2	40.2	41.3	40.5
1977	41.8	41.9	41.9	41.4	42.5	40.9
1978	42.2	42.2	42.1	41.7	43.1	41.9
1979	42.5	42.5	42.3	42.3	43.1	42.0
1980	41.9	42.0	41.8	41.8	42.6	41.0
1981	41.3	41.3	41.3	40.5	42.4	40.8
1982	41.1	41.1	40.9	40.7	41.9	40.8
1983	41.2	41.2	40.8	41.8	42.2	41.4
1984	41.9	41.9	41.2	42.2	42.7	42.0
1985	42.2	42.2	41.5	42.2	43.4	42.3
1986	42.7	42.8	42.1	42.9	43.7	42.4

AVERAGE WEEKLY OVERTIME HOURS

Year	TOTAL[a]	Aircraft, Engines, and Parts	Guided Missiles, Space Vehicles, and Parts
1972	3.0	3.0	2.6
1973	3.2	3.3	2.7
1974	3.3	3.3	3.0
1975	3.0	3.0	3.3
1976	2.7	2.7	2.7
1977	3.5	3.5	3.2
1978	4.4	4.4	4.1
1979	4.7	4.7	4.4
1980	4.1	4.2	3.6
1981	3.5	3.5	3.2
1982	3.2	3.2	3.1
1983	3.1	3.1	3.3
1984	3.9	4.0	3.3
1985	4.5	4.5	4.6
1986	4.8	4.9	4.4

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] TOTAL column is a weighted average based on BLS employment data.

OCCUPATIONAL INJURY AND ILLNESS INCIDENCE RATES[a] ALL MANUFACTURING AND AEROSPACE INDUSTRIES

Calendar Years 1981-1985

	1981	1982	1983	1984[r]	1985
All Manufacturing:					
Total Cases	11.5	10.2	9.7	10.6	10.4
Lost Workday Cases	5.1	4.4	4.7	4.7	4.6
Nonfatal Cases without Lost Workdays	6.4	5.8	5.5	5.9	5.8
Lost Workdays	82.0	75.0	70.4	77.9	80.2
Aircraft and Parts (SIC 372):					
Total Cases	6.2	6.0	5.0	5.8	6.4
Lost Workday Cases	2.6	2.3	1.9	2.2	2.5
Nonfatal Cases without Lost Workdays	3.6	3.6	3.0	3.6	3.9
Lost Workdays	41.7	36.9	33.0	35.3	43.1
Aircraft (SIC 3721):					
Total Cases	4.8	4.8	3.8	4.5	5.4
Lost Workday Cases	1.8	1.7	1.4	1.6	2.0
Nonfatal Cases without Lost Workdays	2.9	3.1	2.4	2.9	3.5
Lost Workdays	29.7	29.5	24.6	28.3	35.8
Aircraft Engines and Parts (SIC 3724):					
Total Cases	6.6	6.6	4.6	5.3	5.2
Lost Workday Cases	3.6	3.3	2.5	2.8	2.7
Nonfatal Cases without Lost Workdays	3.0	3.3	2.1	2.5	2.5
Lost Workdays	64.7	51.5	45.6	45.9	52.0
Aircraft Parts (SIC 3728):					
Total Cases	9.4	8.1	8.0	8.9	9.4
Lost Workday Cases	3.4	2.8	2.6	2.9	3.4
Nonfatal Cases without Lost Workdays	6.0	5.3	5.4	6.1	6.0
Lost Workdays	45.1	39.1	39.0	40.0	50.1
Guided Missiles, Space Vehicles & Parts SIC 376):					
Total Cases	2.6	2.7	2.3	2.7	2.8
Lost Workday Cases	1.2	1.2	1.1	1.2	1.2
Nonfatal Cases without Lost Workdays	1.4	1.5	1.2	1.5	1.5
Lost Workdays	19.2	19.1	19.4	21.0	23.1
Guided Missiles & Space Vehicles (SIC 3761):					
Total Cases	2.1	2.1	2.1	2.5	2.5
Lost Workday Cases	1.0	0.9	1.1	1.1	1.2
Nonfatal Cases without Lost Workdays	1.0	1.2	1.0	1.3	1.3
Lost Workdays	17.3	16.3	19.4	20.0	23.0
Space Propulsion Units & Parts (SIC 3764):					
Total Cases	4.1	3.9	2.8	3.3	4.1
Lost Workday Cases	1.9	1.9	1.3	1.5	1.7
Nonfatal Cases without Lost Workdays	2.2	1.9	1.5	1.8	2.4
Lost Workdays	25.7	28.7	19.5	25.0	27.8
Other Space Vehicle Equipment (SIC 3769):					
Total Cases	4.6	5.4	3.1	3.2	3.1
Lost Workday Cases	1.7	1.6	1.0	0.9	1.1
Nonfatal Cases without Lost Workdays	2.9	3.8	2.0	2.3	2.0
Lost Workdays	23.0	26.7	19.7	22.1	20.6

Source: Department of Labor, Bureau of Labor Statistics, "Occupational Injuries and Illnesses" (Annually).

[a] Defined as the number of injuries and illnesses per 100 full-time workers. Separate incidence rates also available for occupational injuries only.

[r] Revised.

FEDERAL CIVILIAN EMPLOYMENT[a] IN THE DEPARTMENT OF DEFENSE

Fiscal Years 1964-1988

Year	TOTAL	Civil Functions[b]	Military Functions[c]
1964	1,029,756	31,893	997,863
1965	1,004,570	29,902	974,668
1966	1,083,288	30,290	1,052,998
1967	1,225,637	31,980	1,193,657
1968	1,288,130	32,062	1,256,068
1969	1,257,091	31,214	1,225,877
1970	1,159,935	30,293	1,129,642
1971	1,092,804	30,063	1,062,741
1972	1,040,147	30,585	1,009,562
1973	987,281	29,971	957,310
1974	1,002,850	29,072	973,778
1975	983,790	29,069	954,721
1976	951,034	28,648	922,386
1977	940,549	28,912	911,637
1978	933,071	28,962	904,109
1979	914,582	28,592	885,990
1980	907,700	27,700	880,000
1981	981,400	34,400	947,000
1982	1,009,344	31,263	978,081
1983	1,015,779	30,973	984,806
1984	1,040,213	28,681	1,011,532
1985	1,065,551	28,681	1,036,870
1986	1,069,863	28,511	1,041,352
1987[E]	1,067,348	28,348	1,039,000
1988[E]	1,065,347	28,347	1,037,000

Source: "The Budget of the United States Government" (Annually).

[a] Full-time equivalent civilian employment.

[b] Data are estimated for portions of Civil Functions.

[c] Section 904 of the 1982 Defense Authorization Act (Public Law 97-86) exempts the Department of Defense from full-time equivalent controls. Data shown are estimated civilian employment for military functions and military assistance.

[E] Estimate.

EMPLOYMENT IN NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PROGRAMS

End of Fiscal Years 1960-1988

Year	TOTAL	NASA Employees	Contractor Employees[a]
1960	46,768	10,268	36,500
1961	74,577	17,077	57,500
1962	137,656	22,156	115,500
1963	246,304	27,904	218,400
1964	379,084	31,984	347,100
1965	409,900	33,200	376,700
1966	393,924	33,924	360,000
1967	306,926	33,726	273,200
1968	267,871	32,471	235,400
1969	218,345	31,745	186,600
1970	160,850	31,350	129,500
1971	143,578	29,478	114,100
1972	138,800	27,500	111,300
1973	134,850	26,850	108,000
1974	125,220	25,020	100,200
1975	127,733	24,333	103,400
1976	130,739	24,039	108,000
1977	124,136	23,636	100,500
1978	124,637	23,237	101,400
1979	131,931	22,831	109,100
1980	135,613	22,613	113,000
1981	133,473	21,873	111,600
1982	127,952	21,652	106,300
1983	129,246	22,246	107,000
1984	162,080	22,080	140,000
1985	131,993	21,993	110,000
1986	154,800	21,800	133,000
1987[E]	165,312	22,312	143,000
1988[E]	179,425	22,425	157,000

Source: NASA Briefing on the Budget of the United States (Annually), and NASA Headquarters.

[a] Includes estimates of manpower for hardware and related contracts, as well as actual work-years for support service contracts. Increase in FY 1984 caused by change in estimating methodology to reflect more accurately the mix of support and development contractors.

[E] Estimate.

EMPLOYMENT AND COST OF R&D SCIENTISTS AND ENGINEERS ALL INDUSTRIES AND AEROSPACE INDUSTRY

1972-1986

Year	Employment[a]			Cost per R&D Scientist and Engineer[d]	
	All Industries[b] (Thousands)	Aerospace[c] (Thousands)	Aerospace as a Percent of All Industries	All Industries[b]	Aerospace[c]
1972	350.2	70.8	20.2%	$ 55,300	$ 69,200
1973	357.7	72.1	20.2	59,200	70,800
1974	360.0	70.6	19.6	63,300	76,400
1975	363.3	67.5	18.6	66,500	85,100
1976	364.4	66.9	18.4	72,200	91,300
1977	382.8	72.0	18.8	75,800	91,300
1978	404.4	82.0	20.3	80,400	89,400
1979	423.9	86.5	20.4	87,400	93,300
1980	450.6	85.9	19.1	94,900	101,600
1981	487.8	95.2	19.5	103,900	128,400
1982	509.8	91.1	17.9	112,400	146,400
1983[r]	522.1	95.5	18.3	118,900	144,300
1984[r]	544.5	96.5	17.7	129,700	158,400
1985	560.2	103.8	18.5	137,000	167,600
1986	580.3	106.4	18.3	NA	NA

Source: National Science Foundation.

a Employment as of January. Scientists and engineers working less than full time have been included in terms of their full time equivalent number.

b All manufacturing industries and those non-manufacturing industries known to conduct or finance research and development.

c SIC codes 372 and 376.

d The arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years, divided into the total R&D expenditures of each industry during the earlier year.

NA Not available.

r Revised.

AEROSPACE INDUSTRY WORK STOPPAGES[a]

Calendar Years 1977-1986

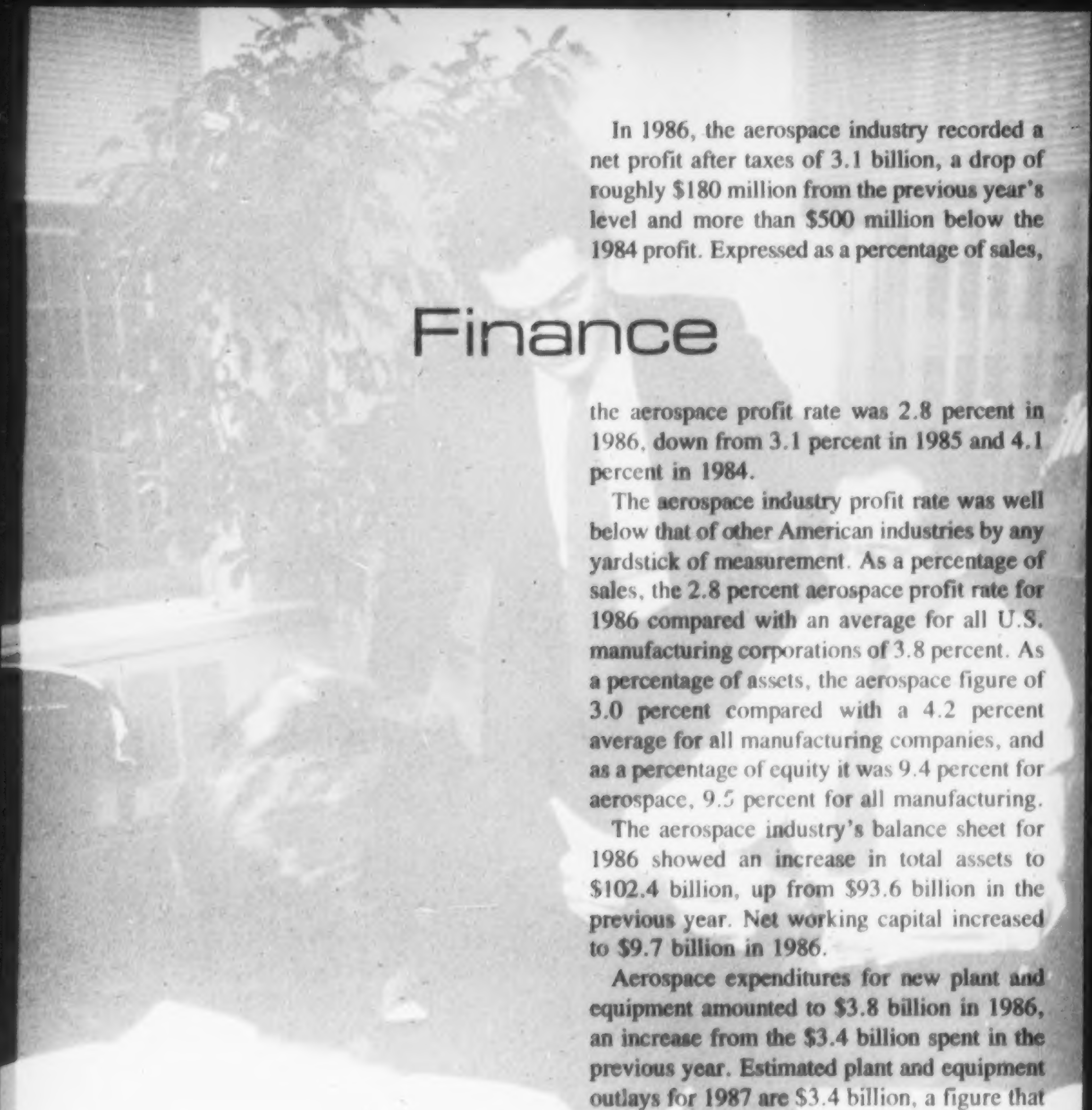
Year[b]	Number of Strikes[c]	Number of Workers Involved	Work-Days Idle in Year
1977	21	46,700	1,832,200
1978	17	13,700	741,200
1979	12	6,600	103,400
1980	17	4,400	92,900
1981	12	6,100	188,900
1982	4	11,900	45,200
1983	2	8,700	404,100
1984	4	14,600	188,200
1985	4	19,700	289,800
1986	—	—	—

Source: Department of Labor, Bureau of Labor Statistics, Division of Wages and Industry Relations.

a Based on SIC 372 of the 1967 Code, which includes missile and space propulsion units and parts and missile and space vehicle equipment not elsewhere classified, but which excludes complete guided missiles and space vehicles.

b Effective 1982, data not available for work stoppages involving fewer than 1,000 employees.

c Strikes beginning during calendar year.



Finance

In 1986, the aerospace industry recorded a net profit after taxes of 3.1 billion, a drop of roughly $180 million from the previous year's level and more than $500 million below the 1984 profit. Expressed as a percentage of sales, the aerospace profit rate was 2.8 percent in 1986, down from 3.1 percent in 1985 and 4.1 percent in 1984.

The aerospace industry profit rate was well below that of other American industries by any yardstick of measurement. As a percentage of sales, the 2.8 percent aerospace profit rate for 1986 compared with an average for all U.S. manufacturing corporations of 3.8 percent. As a percentage of assets, the aerospace figure of 3.0 percent compared with a 4.2 percent average for all manufacturing companies, and as a percentage of equity it was 9.4 percent for aerospace, 9.5 percent for all manufacturing.

The aerospace industry's balance sheet for 1986 showed an increase in total assets to $102.4 billion, up from $93.6 billion in the previous year. Net working capital increased to $9.7 billion in 1986.

Aerospace expenditures for new plant and equipment amounted to $3.8 billion in 1986, an increase from the $3.4 billion spent in the previous year. Estimated plant and equipment outlays for 1987 are $3.4 billion, a figure that corresponds exactly to the average for the first seven years of the 1980s.

In terms of contract dollar value, General Dynamics won contracts totaling $8 billion. In second place was General Electric Company (fourth in 1985) with awards totaling $6.8 billion. McDonnell Douglas Corporation, which had led the list in 1985, placed third with contracts worth $6.6 billion.

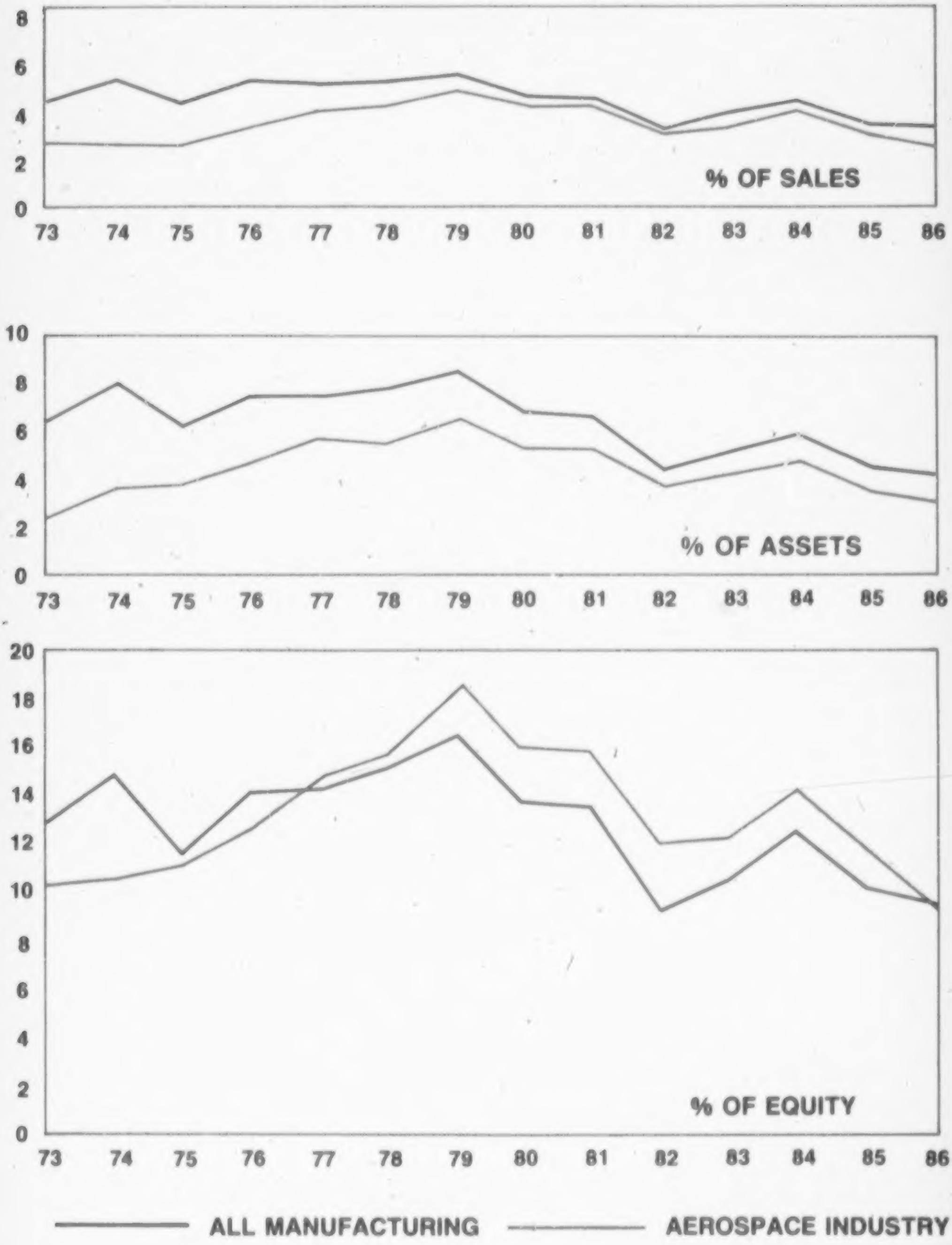
Rounding out the top 10 were Rockwell International Corporation ($5.6 billion); General Motors Corporation, including sales of its annexed Hughes Aircraft Company ($5.1 billion); Lockheed Corporation ($4.9 billion); Raytheon Company ($4.1 billion); The Boeing Company ($3.6 billion); United Technologies

Corporation ($3.5 billion); and Grumman Corporation ($3 billion).

Perennial leader Rockwell International once again topped the list of NASA contract awards in FY 1986 with $1.2 billion. Lockheed Space Operations Company, which handles management of Space Shuttle processing operations, was second with $559 million. In third and fourth places were two other Shuttle contractors, Martin Marietta Corporation ($427 million), builder of the Shuttle's External Tank, and Morton Thiokol Company ($320 million), manufacturer of the Solid Rocket Booster. The top four held the same relative ranking in 1985.

The rest of the 1986 top 10 included McDonnell Douglas Corporation ($266 million); Ford Aerospace and Communications ($208 million); United Space Boosters ($196 million); General Dynamics Corporation ($194 million); RCA Corporation ($141 million); and Allied Bendix Aerospace ($138 million).

NET PROFIT AFTER TAXES



Source: Aerospace Industries Association

NET PROFIT AFTER TAXES AS A PERCENT OF SALES, ASSETS, AND EQUITY FOR ALL MANUFACTURING CORPORATIONS AND THE AEROSPACE INDUSTRY[a]

Calendar Years 1972-1986

PERCENT OF SALES

Year	All Manufacturing Corporations	Non-Durable Goods	Durable Goods	Aerospace Industry
1972	4.4%	4.6%	4.3%	2.4%
1973	4.7	5.0	4.5	2.9
1974	5.5	6.4	4.7	2.9
1975	4.6	5.1	4.1	2.9
1976	5.4	5.5	5.2	3.4
1977	5.3	5.3	5.3	4.2
1978	5.4	5.4	5.5	4.4
1979	5.7	6.1	5.2	5.0
1980	4.8	5.6	4.0	4.3
1981	4.7	5.1	4.3	4.4
1982	3.5	4.6	2.4	3.3
1983	4.1	4.9	3.1	3.5
1984	4.7	4.8	4.4	4.1
1985[r]	3.8	4.1	3.4	3.1
1986	3.8	4.6	2.9	2.8

PERCENT OF ASSETS[b] AND EQUITY[b]

Year	Percent of Assets		Percent of Equity	
	All Manufacturing	Aerospace Industry	All Manufacturing	Aerospace Industry
1972	5.5%	2.7%	11.1%	8.6%
1973	6.5	2.4	12.8	10.3
1974	8.0	3.7	14.9	10.4
1975	6.2	3.8	11.6	11.0
1976	7.5	4.7	14.0	12.8
1977	7.6	5.7	14.2	14.9
1978	7.8	5.5	15.0	15.7
1979	8.4	6.3	16.5	18.4
1980	6.9	5.2	13.9	16.0
1981	6.7	5.2	13.6	15.9
1982	4.5	3.7	9.2	12.0
1983	5.2	4.1	10.6	12.2
1984	5.9	4.7	12.5	14.1
1985	4.6	3.5	10.1	11.1
1986	4.2	3.0	9.5	9.4

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

[a] Based on a sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and propulsion and parts.

[b] Average of four quarters.

[r] Revised.

INCOME STATEMENT AND OPERATING RATIOS FOR AEROSPACE COMPANIES[a]

Calendar Years 1983-1986
(Millions of Dollars)

INCOME STATEMENT	1983	1984	1985[r]	1986
Net Sales, Receipts, Operating Revenues	$81,441	$88,728	$105,853	$111,580
Less: Depreciation, Depletion & Amortization of Property, Plant and Equipment	2,203	2,502	3,083	3,411
Less: All Other Operating Costs & Expenses, Including Selling Costs & General & Administrative Expenses	75,044	80,695	97,752	102,568
Income (or Loss) from Operations	$ 4,193	$ 5,531	$ 5,018	$ 5,600
Net Non-Operating Income (Expense)	429	37	679	(264)
Income (or Loss) before Income Taxes (= Total Income)	$ 4,622	$ 5,567	$ 5,696	$ 5,337
Less: Provision for Current & Deferred Domestic Income Taxes	1,791	1,928	2,422	2,243
Income (or Loss) after Income Taxes (= Net Profit)	$ 2,829	$ 3,639	$ 3,274	$ 3,093
Cash Dividends Charged to Retained Earnings	985	1,124	1,871	1,432
Net Income Retained in Business	$ 1,845	$ 2,516	$ 1,403	$ 1,661
Retained Earnings at Beginning of Year[b]	15,479	17,705	20,558	20,475
Adjustments to Retained Earnings[c]	75	31	(1,452)	(414)
Retained Earnings at End of Year[d]	$17,398	$20,252	$ 20,509	$ 21,722

OPERATING RATIOS				
Income before Taxes as Percent of Net Sales	5.7%	6.3%	5.4%	4.8%
Provision for Current & Deferred Domestic Income Taxes as Percent of Income before Taxes (Total Income)	38.7	34.6	42.5	42.0
Income after Taxes (Net Profit) as Percent of Net Sales	3.5	4.1	3.1	2.8
Income after Taxes (Net Profit) as Percent of Stockholders' Equity[e]	12.2	14.1	11.1	9.4
Income after Taxes (Net Profit) as Percent of Total Assets[e]	4.1	4.7	3.5	3.0

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations."

NOTE: Detail may not add to totals because of rounding.

[a] Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and propulsion and parts.

[b] Beginning-of-year retained earnings for any particular year do not equal end-of-year retained earnings for the previous year because of rotation of small companies in survey sample.

[c] Other direct credits (or charges) to retained earnings (net), including stock and other non-cash dividends, etc.

[d] Retained Earnings at End of Year CALCULATED AS Retained Earnings at Beginning of Year PLUS Income (Loss) after Income Taxes MINUS Cash Dividends Charged to Retained Earnings PLUS Adjustments to Retained Earnings.

[r] During the first quarter of 1986, a considerable number of companies were reclassified by industry. To provide comparability, data for 1985 have been restated to reflect these reclassifications.

[e] Average of four quarters.

BALANCE SHEET FOR AEROSPACE COMPANIES[a]

December 31, 1983-1986
(Millions of Dollars)

	1983	1984	1985[r]	1986
Assets:				
Current Assets				
Cash	$ 2,070	$ 2,184	$ 5,300	$ 4,524
Securities, Com'l Paper & Other Short-term Financial Investments	2,716	2,904	937	2,352
Total Cash and U.S. Gov't and Other Securities	$ 4,786	$ 5,089	$ 6,236	$ 6,876
Receivables (Total)	8,661	10,165	12,126	13,077
Inventories (Gross)	31,716	37,569	38,967	41,028
Other Current Assets	821	1,266	1,623	1,582
Total Current Assets	$45,983	$54,088	$58,952	$ 62,562
Net Plant, Property & Equipment	14,613	15,773	19,454	22,103
Other Non-Current Assets	9,421	10,235	15,161	17,748
Total Assets	$70,017	$80,096	$93,567	$102,414
Liabilities:				
Current Liabilities				
Short Term Loans	$ 899	$ 1,680	$ 2,480	$ 1,547
Trade Accts. & Notes Payable	5,884	6,672	8,148	8,926
Income Taxes Accrued	3,426	4,378	5,033	5,723
Installments Due on Long Term Debts	421	614	518	545
Other Current Liabilities	25,633	31,014	33,828	36,162
Total Current Liabilities	$36,264	$44,359	$50,007	$ 52,903
Long Term Debt	5,206	4,818	7,844	10,915
Other Non-Current Liabilities	4,157	4,302	6,020	5,701
Total Liabilities	$45,627	$53,478	$63,871	$ 69,520
Stockholders' Equity:				
Capital Stock	$ 6,993	$ 6,366	$ 9,188	$ 11,172
Retained Earnings	17,398	20,252	20,509	21,722
Total Stockholders' Equity	$24,391	$26,618	$29,696	$ 32,894
Total Liabilities & Stockholders' Equity	$70,017	$80,096	$93,567	$102,414
Net Working Capital	$ 9,719	$ 9,730	$ 8,945	$ 9,659

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

NOTE: Detail may not add to totals because of rounding.

[a] Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles and propulsion and parts.

[r] During the first quarter of 1986, a considerable number of companies were reclassified by industry. To provide comparability, the data for 1985 have been restated to reflect these reclassifications.

NEW PLANT AND EQUIPMENT EXPENDITURES

Calendar Years 1963-1987
(Billions of Dollars)

Year	All Industries	All Manufacturing Industries	Durable Goods	Aerospace[a]	
				Current Dollars	Constant Dollars 1982 = 100[b]
1963	$ 43.67	$ 17.27	$ 8.64	$0.44	$1.31
1964	51.26	21.23	10.98	0.41	1.23
1965	59.52	25.41	13.49	0.53	1.58
1966	70.40	31.37	17.23	1.17	3.38
1967	72.75	32.25	17.83	1.25	3.50
1968	76.42	32.34	17.93	1.23	3.29
1969	85.74	36.27	19.97	1.29	3.30
1970	91.91	36.99	19.80	0.88	2.17
1971	92.91	33.60	16.78	0.63	1.48
1972	103.40	35.42	18.22	0.68	1.57
1973	120.03	42.35	22.63	0.79	1.77
1974	139.67	52.48	26.77	1.21	2.46
1975	142.42	53.66	25.37	1.19	2.12
1976	158.44	58.53	27.50	1.02	1.70
1977	184.82	67.48	32.77	1.14	1.77
1978	217.76	78.58	39.46	1.76	2.50
1979	254.96	95.92	48.50	2.70	3.49
1980	282.80	112.33	55.36	3.57	4.25
1981	315.22	126.54	59.81	3.36	3.62
1982	310.58	120.68	55.35	3.41	3.41
1983	304.78	116.20	53.08	2.91	3.06
1984	354.44	138.82	66.24	3.57	3.79
1985[r]	387.13	153.48	73.27	3.45	3.74
1986	379.27	142.73	69.08	3.81	4.15
1987[E]	390.80	144.88	70.60	3.38	3.33

Source: U.S. Department of Commerce, Bureau of Economic Analysis (BEA), Quarterly Report.

[a] Data are company-based (not establishment- or product-based), and represent corporate entities whose principal activity falls in SIC Codes 372 and 376.

[b] Aerospace constant dollars based on BEA's industry deflator for historical data, and Durable Goods deflator for current year estimates.

[E] Estimate.

[r] Revised

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MAJOR CONTRACTORS

Fiscal Years 1982-1986
By rank according to net value of NASA prime contracts awarded during last fiscal year
(Millions of Dollars)

Company	1982	1983	1984	1985	1986
TOTAL PROCUREMENTS	$5,884	$6,797	$7,354	$8,298	$8,180
Awards to Business Firms	4,806	5,586	5,967	6,653	6,356
% of TOTAL PROCUREMENTS	82%	82%	81%	80%	78%
Rockwell International Corp.	$1,564	$1,568	$1,402	$1,345	$1,156
Lockheed Space Operations Co.	(*a*)	19	301	551	559
Martin Marietta Corp.	310	466	428	483	427
Morton Thiokol Inc.	152	268	322	334	320
McDonnell Douglas Corp.	220	237	200	194	266
Ford Aerospace & Communications	74	107	106	120	208
United Space Boosters Inc.	127	115	197	207	196
General Dynamics Corp.	114	156	253	300	194
RCA Corp	24	57	68	102	141
Allied Bendix Aerospace	109	137	163	150	138
Lockheed Engrg. & Mgmt. Co. Inc.	89	101	105	125	124
Lockheed Missles & Space Co.	69	96	102	137	121
EG&G Florida Inc.	(*a*)	68	109	108	117
Boeing Co.	41	44	44	69	113
United Technologies Corp.	90	116	118	110	97
Computer Sciences Corp.	138	147	89	102	96
IBM Corp.	107	116	134	124	94
TRW Inc.	44	49	82	103	85
Comtel Corp.	(*a*)	(*a*)	(*a*)	(*a*)	69
General Electric Co.	97	85	44	43	66
Planning Research Corp.	55	57	57	65	51
Teledyne Industries Inc.	29	47	52	46	48
Pan American World Serv. Inc.	35	36	40	49	47
Northrop Services Inc.	25	29	32	39	41
Boeing Technical Operat. Inc.	82	86	25	39	36
Raytheon Service Co.	20	21	28	25	28
Lockheed Corp.	7	9	18	30	27
Management & Technical Services	16	18	20	26	27
Ball Corp.	26	39	39	30	27
Fairchild Industries Inc.	8	10	14	20	26

Source: National Aeronautics and Space Administration, "NASA Annual Procurement Report," (Annually).

a Not in list of major contractors for indicated year(s).

DEPARTMENT OF DEFENSE MAJOR CONTRACTORS

Fiscal Years 1982-1986
Listed by rank according to net value of prime contracts awarded during last fiscal year[a]
(Millions of Dollars)

Company	1982	1983	1984	1985	1986
TOTAL CONTRACTS	$116,660	$128,242	$133,571	$150,674	$145,742
General Dynamics Corp.	$ 5,891	$ 6,818	$ 5,952	$ 7,440	$ 8,013
General Electric Co.	3,654	4,518	4,514	5,891	6,847
McDonnell Douglas Corp.	5,630	6,143	7,684	8,857	6,586
Rockwell International Corp.	2,691	4,545	6,219	6,264	5,590
General Motors Corp.[d]	690	893	1,019	1,614	5,069
Lockheed Corp.	3,499	4,006	4,967	5,082	4,896
Raytheon Co.	2,262	2,728	3,093	2,999	4,052
Boeing Co.	3,239	4,423	4,654	5,458	3,556
United Technologies Corp.	4,208	3,867	3,207	3,906	3,527
Grumman Corp.	1,900	2,298	2,419	2,733	2,967
Martin Marietta Corp.	2,008	2,272	2,261	2,717	2,935
Honeywell Inc.	1,217	1,114	1,354	1,908	1,846
Westinghouse Electric Corp.	1,492	1,778	1,944	1,941	1,713
Textron Inc.	584	672	805	1,920	1,671
Litton Industries Inc.	1,317	2,169	2,441	1,528	1,663
LTV Corp.	548	1,343	1,655	1,585	1,445
Sperry Corp.	1,149	1,133	1,615	1,628	1,557
Texas Instruments Inc.	584	467	956	1,426	1,435
IBM Corp.	1,197	1,421	1,572	1,783	1,359
Eaton Corp.	337	442	1,117	923	1,068
TRW Inc.	869	1,137	983	1,079	1,053
Allied Signal Corp.[b]	592	778	759	1,348	1,043
GTE Corp.	567	674	708	611	1,041
Royal Dutch Petroleum Co.	327	336	269	893	986
AT&T Co.	753	878	768	688	914
Singer Co.	549	650	561	752	871
FMC Corp.	1,371	1,236	1,157	831	863
ITT Corp.	443	603	1,140	1,503	799
Chevron Corp.	(c)	(c)	432	512	794
Ford Motor Co.	897	1,072	1,124	1,019	752

Source: Department of Defense, "100 Companies Receiving the Largest Dollar Volume of Prime Contract Awards," (Annually).

[a] Effective 1980, data include DOD contract awards for civil functions, while data for prior years were limited to military prime contract awards.

[b] For 1980-1982, data represent Bendix Corporation.

[c] Not in top 100 companies for indicated year(s).

[d] Includes amounts previously reported for Hughes Aircraft Co. beginning in 1986.

DEPARTMENT OF DEFENSE PRIME CONTRACT AWARDS OVER $25,000 FOR SELECTED MAJOR MILITARY HARD GOODS

By Geographic Region
Fiscal Years 1984, 1985, 1986

Program and Region	Millions of Dollars			Percent of Program Total		
	1984	1985	1986	1984	1985	1986
AIRCRAFT—TOTAL . .	$31,796	$38,449	$35,281	100.0%	100.0%	100.0%
New England	4,324	4,633	3,578	13.6	12.0	10.1
Middle Atlantic	3,758	4,577	4,463	11.8	11.9	12.6
East North Central	2.277	4,105	4,202	7.2	10.7	11.9
West North Central . . .	5,595	6,737	5,015	17.6	17.5	14.2
South Atlantic	3,471	4,461	4,398	10.9	11.6	12.5
East South Central . . .	337	455	392	1.1	1.2	1.1
West South Central . . .	3,330	4,118	4,898	10.5	10.7	13.9
Mountain	395	564	766	1.2	1.5	2.2
Pacific[a]	8,309	8,801	7,659	26.1	22.9	21.5
MISSILE & SPACE SYSTEMS—TOTAL . .	$20,475	$21,510	$21,510	100.0%	100.0%	100.0%
New England	2,795	3,158	3,950	15.2	15.4	18.4
Middle Atlantic	842	1,090	1,036	4.6	5.3	4.8
East North Central	270	166	173	1.5	0.8	0.8
West North Central . . .	1,135	1,306	1,264	6.2	6.4	5.9
South Atlantic	1,920	2,072	1,863	10.4	10.1	8.7
East South Central . . .	239	317	615	1.3	1.6	2.9
West South Central . . .	1,323	1,570	1,977	7.2	7.7	9.2
Mountain	1,664	1,973	2,469	9.0	9.6	11.5
Pacific[a].	8,196	8,824	8,162	44.6	43.1	37.9
ELECTRONICS & COMMUNICATIONS EQUIPMENT—TOTAL	$21,388	$23,161	$21,050	100.0%	100.0%	100.0%
New England	2,091	1,988	2,135	9.8	8.6	10.1
Middle Atlantic	4,520	5,242	4,373	21.1	22.6	20.8
East North Central	1,118	1,608	1,215	5.2	6.9	5.8
West North Central . . .	1,977	1,623	1,502	9.2	7.0	7.1
South Atlantic	4,142	4,841	5,192	19.4	20.9	24.7
East South Central . . .	129	153	126	0.6	0.7	0.6
West South Central . . .	886	1,272	963	4.1	5.5	4.6
Mountain	759	842	847	3.5	3.6	4.0
Pacific[a]	5,766	5,592	4,697	27.0	24.1	22.3

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).
NOTE: Detail may not add to totals because of rounding.
[a] Includes Alaska and Hawaii.

Glossary

Aeronautics: the science that treats of the operation of aircraft, also, the art or science of operating aircraft.

AIA: Aerospace Industries Association of America, Inc., formerly Aircraft Industries Association.

Aerospace Industry: the industry engaged in research, development and manufacture of aerospace systems, including manned and unmanned aircraft; missiles, space launch vehicles, and spacecraft; propulsion, guidance and control units for all of the foregoing; and a variety of airborne and ground based equipment essential to the test, operation, and maintenance of flight vehicles.

Aerospace Employment: annual average calculated as one-twelfth of sum of monthly estimates of total number of persons employed during a designated pay period by the aircraft and missile and space industries (SIC 372 and 376) plus estimated aerospace-related employment in the communications equipment (SIC 3662) and instruments (SIC 381 and 382) industries and in certain other industries (SIC 28, 35, 73, 89, etc.).

Aerospace Payroll: estimated on the basis of average weekly earnings for a given calendar year for production workers plus an estimated annual salary for other employees.

Aerospace Sales: the AIA estimate of aerospace industry sales, developed by summing DOD expenditures for aircraft, missiles, and space-related procurement and RDT&E; NASA expenditures for research and development, and space flight control and data communications; outlays for space activities by other U.S. Government departments and agencies; commercial sales of space-related products; net domestic and export sales of civil aircraft, engines, and parts; FMS and commercial exports of military aircraft, missiles, propulsion, and related parts; and sales of related products and services, including electronics, software, and ground support equipment, plus sales of non-aerospace products which are produced in aerospace-manufacturing establishments and which use technology, processes, and materials derived from the aerospace industry. See also Related Products and Services.

Air Carriers: the commercial system of air transportation, consisting of domestic and international scheduled and charter service.

Aircraft: all airborne vehicles supported either by buoyancy or by dynamic action. Used in this volume in a restricted sense to mean an airplane—any winged aircraft, including helicopters but excluding gliders and guided missiles.

Aircraft Agreement (Agreement on Trade in Civil Aircraft): negotiated in the Tokyo Round of the Multilateral Trade Negotiations, and implemented January 1, 1980, providing for elimination of tariff and nontariff trade barriers in the civil aircraft sector.

Aircraft Industry: the industry primarily engaged in the manufacture of aircraft, aircraft engines and parts, aircraft propellers and parts, and aircraft parts and auxiliary equipment. A sector of the **Aerospace Industry.**

Airframe: the structural components of an airplane, such as fuselage, empennage, wings, landing gear, and engine mounts, but excluding such items as engines, accessories, electronics and other parts that may be replaced from time to time.

Airlines: see **Air Carriers.**

Appropriation (Federal Budget): an act of Congress authorizing an agency to incur obligations and make payments out of funds held by the Department of the Treasury.

Assets, Net: the sum of all recorded assets after reducing such amount by allowance of reserve for bad debts, depreciation and amortization, but before deducting any liabilities, mortgages or other indebtedness.

Astronautics: the art and science of designing, building and operating manned or unmanned space objects.

Average Weekly Hours: average hours for which pay was received; different from standard or scheduled hours.

Avionics: Communications, navigation, flight controls, and displays.

Backlog: the sales value of orders accepted (supported by legal documents) that have not yet passed through the sales account.

Budget Authority: authority provided by the Congress; mainly in the form of **Appropriations,** which allows Federal agencies to incur obligations to spend or lend money.

Bureau of the Census: an agency of the Department of Commerce.

Bureau of Economic Analysis (BEA): an agency of the Department of Commerce.

Bureau of Labor Statistics (BLS): an agency of the Department of Labor.

Constant Dollars, see **Deflator.**

Deflator: index used to convert a price level to one comparable with the price level at a different time, offsetting the effect of inflation. The base period, which equals 100, is usually specified as either a given fiscal or calendar year. **Constant Dollars** are calculated by dividing current ('then-year') dollars by appropriate price deflator, and multiplying by 100.

Depreciation: the general conversion of the depreciable cost of a fixed asset into expense, spread over its remaining life. There are a number of methods, all based on a periodic charge to an expense account and a corresponding credit to a reserve account.

Development: the process or activity of working out a basic design, idea or piece of equipment (see **Research**).

DOD: Department of Defense.

DOE: Department of Energy.

DOT: Department of Transportation.

Durable Goods Industry: comprised of major manufacturing industry groups with SIC Codes 24, 25, and 32-39. All major manufacturing industry groups in SIC Codes 20-23 and 26-31 are considered nondurable goods manufacturing industry groups.

Earnings: the actual return to the worker for a stated period of time. Irregular bonuses, retroactive items, payments of various welfare benefits, and payroll taxes paid by employers are excluded.

Average Hourly Earnings: on a "gross" basis, reflecting not only changes in basic hourly and incentive wage rates, but also such variable factors as premium pay for overtime and late shift work, and changes in output of workers paid for an incentive plan.

Average Weekly Earnings: derived by multiplying average weekly hours by hourly earnings.

ERDA: Energy, Research and Development Administration. ERDA was formed in 1974 to bring together activities previously scattered among several agencies. The major elements covered were nuclear energy, fossil energy, solar and geothermal energy, conservation through increased efficiency and environmental controls. Most of these functions were assumed by the Department of Energy as of October 1, 1977.

Establishment: the basis for reporting to the Census of Manufacturers; an operating facility in a single location.

Evaluation: (Department of Defense): determination of technical suitability of material, equipment or a system; see **RDT&E.**

Expenditures (Federal Budget): see **Outlays.**

Exports: domestic merchandise including commodities which are grown, produced, or manufactured in the United States, and commodities of foreign origin which have been changed in the United States from the form in which they were imported, or which have been enhanced in value by further manufacture in the United States, and which are traded or sold to other nations.

Export-Import Bank of the United States (Eximbank): created in 1934, and established as an independent U.S. Government Agency in 1945, Eximbank is designed ". . . to aid in financing and to facilitate exports . . ." Eximbank receives no appropriations from the U.S. Congress. It is directed by statute to (1) offer financing that is competitive with that offered exporters of other countries by their official export credit institutions, (2) determine that the transactions supported provide for a reasonable assurance of repayment, (3) supplement, but not compete with private sources of export financing, and (4) take into account the effect of its activities on small business, the domestic economy, and U.S. employment.

FAA: Federal Aviation Administration (formerly the Federal Aviation Agency), an agency of the Department of Transportation.

Facility: a physical plant or installation including real property, building, structures, improvements and plant equipment.

Fiscal Year (Federal Budget): until June 30, 1976, year beginning July 1 and ending June 30, and designated by the year in which it ends. Beginning October 1, 1976, the fiscal years run from October 1 through September 30 and are designated by the year in which they end. A three month **Transition Quarter** from July 1 through September 30, 1976, belongs to neither fiscal year.

Flyaway Value: includes the cost of the airframe, engines, electronics, communications, armament and other installed equipment.

Foreign Military Sales (FMS): export sales to foreign governments arranged through the Department of Defense, whereby DOD recovers full purchase price and administrative costs; often mistakenly used to include foreign military aid and foreign commercial sales as well.

FY: see **Fiscal Year.**

General Agreement on Tariff and Trade (GATT): a multilateral treaty, subscribed to by over 80 governments which together account for more than four-fifths of world trade; its aim is to liberalize world trade; the only multilateral instrument that lays down agreed rules for international trade.

General Aviation: all civil flying except that of air carriers.

GNP (Gross National Product): the market value of the total output of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for business and institutional consumption of durable goods. It includes the purchase of goods and services by consumers and government, gross private domestic investment and net exports.

Helicopter: a rotary-wing aircraft which depends principally for its support and motion in the air upon the lift generated by one or more power-driven rotors, rotating on substantially vertical axes. A helicopter is a **V/STOL.**

Heliport: an area, either at ground level or elevated on a structure, that is used for the landing and take-off of **helicopters** and includes some or all of the various facilities useful to helicopter operations such as helicopter parking, hangar, waiting room, fueling and maintenance equipment.

Helistop: a minimum facility **heliport,** either at ground level or elevated on a structure for the landing and takeoff of **helicopters** but without such auxiliary facilities as waiting room, hangar parking, etc.

ICBM: Intercontinental Ballistic Missile, with a range of more than 5,000 miles.

Imports: classified as "general imports" or "imports for consumption." This volume refers generally to "imports for consumption," which are entries for immediate consumption plus merchandise withdrawn from bonded storage warehouses for consumption. Data are compiled from Import Entries filed with U.S. Customs officials, and are in general based on the market value or price in the foreign country at the time of exportation of such merchandise, including the cost of containers and coverings, as well as other charges and expenses incidental to placing the merchandise in condition, packed and ready for shipment to the United States, but excluding import duties, insurance, freight and other charges incidental to arrival of the goods in the United States. The foreign values of imported merchandise are converted into U.S. currency at the rate of exchange prevailing on the day the merchandise is shipped to the United States.

Income:

- **Net Operating Income:** total net sales (see **Sales**) less total operating costs.
- **Net Income (Before Income Taxes): Net Operating Income** plus or minus **"Other Income and Expenses."**
- **Other Income and Expenses:** includes interest income, royalty income, capital gains and losses, interest expense, cash discounts, etc.
- **Net Income (After Income Taxes): Net Income (Before Taxes)** less federal income taxes.

Lump-Sum Wage Payment: a one time payment given in lieu of general wage increases and/or cost of living adjustments in labor settlements.

Manufacturing Industries: those **establishments** engaged in the mechanical or chemical transformation of inorganic or organic substances into new products, and usually described as plants, factories, or mills, which characteristically use power-driven machines and materials-handling equipment; also establishments engaged in assembling component parts of manufactured products if the new product is neither a structure nor other fixed improvement.

Merchandise Trade Balance: the difference between the value of U.S. goods exported to other countries and foreign goods imported into this country. The trade balance is generally regarded as "favorable" when **exports** exceed **imports**—a trade surplus—and "unfavorable" when **imports** exceed **exports**—a trade deficit.

Missile: sometimes applied to space launch vehicles, but more properly connotes automated weapons of warfare, *i.e.*, a weapon which has an integral system of guidance, as opposed to the unguided rocket.

Multilateral Trade Negotiations (MTN): a forum within the **GATT** in which countries negotiate to overcome their trade problems. In September 1973, in Tokyo, over 100 nations launched new multilateral trade negotiations, called the "Tokyo Round," covering both tariff and non-tariff barriers to trade in industrial and agricultural products, and improvements in the **GATT** itself.

NASA: National Aeronautics and Space Administration.

NATO: North Atlantic Treaty Organization.

New Obligational Authority (Federal Budget): see **Budget Authority.**

Non-Aerospace Products and Services: products and services other than aircraft, missiles, space vehicles, and related propulsion and parts, produced or performed by establishments whose principal business is the development and/or manufacture of aerospace products.

OASD: Office of the Assistant Secretary of Defense.

Obligations (Federal Budget): commitments made by Federal agencies to pay out money for products, services or other purposes—as distinct from the actual payments. Obligations incurred may not be larger than **budget authority.**

Orders, Net New: the sales value of new orders (supported by legal documents) minus cancellations during the period.

Other Aerospace Products and Services: all conversions, modifications, site activation, and other aerospace products (including drones) and services, plus research and development under contract, defined as basic and applied research in the sciences and in engineering, and design and development of prototype products and processes.

Outlays: checks issued, interest accrued on the public debt, or other payments made, net of refunds and reimbursements.

Overtime Hours: that portion of the gross average weekly hours which was in excess of regular hours and for which premium payments were made.

Payroll, All Manufacturing: includes the gross earning paid in the calendar year to all employees on the payroll of operating manufacturing **establishments.** Includes all forms of compensation paid directly to workers such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Does not include employers' Social Security contributions or other non-payroll labor costs such as employees' pension plans, group insurance premiums, and workmen's compensation.

Passenger-Mile: one passenger moved one mile.

Procurement: the process whereby the executive agencies of the Federal Government acquire goods and services from enterprises other than the Federal Government.

Production Workers: includes working foremen and all non-supervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, janitorial services, product development, auxiliary production for plant's own use and record keeping and services closely associated with the above production operations.

R&D: Research and Development.

Research: systematic study directed toward fuller scientific knowledge or understanding of the subject studied. Research is classified as either **basic** or **applied** according to the objectives of the sponsoring agency.

Basic Research: with the objective of gaining fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

Applied Research: with the objective of gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

Development: the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, or methods including design and development of prototype and processes.

Independent Research and Development (IR&D): a term devised by the Department of Defense and used by Federal agencies to differentiate between a contractor's research and development technical effort performed under a contract, grant, or other arrangement (R&D) and that which is self-initiated and self-funded (IR&D).

Industrial Research and Development: research and development work performed within company facilities, funded by company or Federal funds, and excluding company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

RDT&E: (Department of Defense): Research, Development, Test and Evaluation.

Related Products and Services: Sales of electronics, software, and ground equipment in support of aerospace products, plus sales by aerospace manufacturing establishments of systems and equipment which are generally derived from the industry's aerospace technological expertise in design, materials, and processes, but which are intended for applications other than flight.

Research: see **R&D.**

Rotorcraft: an aircraft which in all its usual flight attitudes is supported in the air wholly or in part by a rotor or rotors, *i.e.*, airfoils rotating or revolving about an axis (see **Helicopter**).

Sales: net of returns, allowances, and discounts, the dollar value of shipments, including dealer's commission, if any, which have passed through the sales account.

Satellite: a body that revolves around a larger body, such as the moon revolving around the earth, or a man-made object revolving about any body such as the sun, earth, or moon.

SIC (Standard Industrial Classification): a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. See **Aerospace Industry** for explanation of SIC codes applicable to the aerospace industry.

Space Vehicle: an artificial body operating in outer space (beyond the earth's atmosphere).

Stockholder's Equity: assets minus all obligations of the corporation, except those to stockholders. Annual data are average equity for the year (using four end-of-quarter figures.) For details, see "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations," compiled by the Bureau of the Census.

STOL: short take-off and landing aircraft.

Test (Department of Defense): an experiment designed to assess progress in attainment or accomplishment of development objectives (see **RDT&E**).

Thrust: the driving force exerted by an engine, particularly an aircraft or missile engine, in propelling the vehicle to which it is attached.

Ton-Mile: one ton moved one mile.

Total Obligational Authority: the sum of **budget authority** granted or requested from the Congress in a given year, plus unused **budget authority** from prior years.

Trade Balance: see **Merchandise Trade Balance.**

Transition Quarter (Tr. Qtr.): the three-month interval from July 1, 1976 to September 30, 1976. See **Fiscal Year.**

Turbine, Turbo: a mechanical device or engine that spins in reaction to a fluid flow that passes through or over it. Frequently used in "turboprop" or "turbojet."

U.K.: United Kingdom.

U.S.: United States of America.

USA: United States Army, an agency of the U.S. Department of Defense.

USAF: United States Air Force, an agency of the U.S. Department of Defense.

USN: United States Navy, an agency of the U.S. Department of Defense.

USSR: Union of Soviet Socialist Republics.

Utility Aircraft: an aircraft designed for general purpose flying.

V/STOL: vertical short take-off and/or landing aircraft.

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